



FRIDAY, APRIL 15, 1904.

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Contributions

The Limitations of Discipline—Three Letters.

FROM A SUPERINTENDENT ON A TRUNK LINE.

Your editorial on the Limitations of Discipline brings out many new ideas of great value. Hard and fast rules to cover all conditions cannot be made. The question resolves itself into getting as much for your money as you can. The law of supply and demand largely governs the labor situation and operating officials must adapt themselves to the condition. The labor question is the underlying foundation on which discipline must be built. On a long railroad with uniform rates of wages one division superintendent may find himself with an abundance of high class labor while another finds it difficult to keep all positions filled with men of even ordinary ability. The rate of wages paid has an important bearing on discipline. A prominent traffic official remarked that freight rates were regulated by "comparison, competition and compromise." The same holds true as to adjustment of wages.

Many years of experience and experiment with all kinds of methods, convinces me that "surprise checking" will not always, and at least not permanently, attain the desired results. A certain spirit of disloyalty will be originated as a result of the implied lack of confidence. While men may be beaten into line their work will be sluggish and lack that snap which is so noticeable on well handled roads. Years ago a trainmaster watched the performance of his men by unexpectedly turning up at unusual points along the line; but the men soon installed a very successful system of checking the trainmaster, and his movements were watched so that by a system of hand and telegraphic signals they generally knew where to find him. By proper and discreet handling division officers can obtain much information from the men themselves. This cannot be done, however, when employees feel that they are not being trusted.

The theory has often been advanced that the organization of a railroad should follow that of the army, with similar discipline. There is no similarity in the work performed by the two organizations. An army has many officers and being a compact mass its men are under close and constant surveillance. The men employed on a division of a railroad are scattered far and wide and most of them are under no direct supervision. Even the conductor of a train cannot at all times keep the members of his crew within range of his vision. It is, therefore, essential that a proper esprit de corps be maintained and the men be impressed with the idea that confidence is reposed in them.

An article in your paper some weeks ago entitled "The Division Superintendent's Work" contained much wisdom. It was only necessary to read a few lines to convince one that the writer of that article had "been there." His remarks on the subject of "specialists" were apt and to the point. The specialist cannot cover his ground in detail

and his work may weaken the division organization. Let a specialist make it his business to review train-order books, for instance, and the result will be that the division officer whose duty it is to supervise and inspect forms of orders will not take the proper interest in this work.

There is a tendency everywhere to work too much on special lines. A road foreman of engines, a traveling fireman, a division engineer or a road supervisor who will not call attention to a case where an engineman does not respect a signal in the stop position is exceedingly narrow. If the road foreman of engines, for example, only interests himself sufficiently to know that engines are being properly handled and fired he is hardly competent to fill his position, which is supposed to be one above and beyond the capabilities of the average engineman. If he does not take an interest in matters outside of the management of an engine, he will soon be outgrown and, on account of his general lack of knowledge, he will be a weak road foreman. The extent to which he interests himself in all operating matters is the measure of his efforts to fit himself to assume increased responsibilities. No man can command a position with increased responsibilities and compensation until he has demonstrated that he is not only capable of but actually is earning more than he receives in his present position.

The parallel you draw of the intelligent groceryman and his newly employed clerk is to the point. The clerk will be expected to apply himself to all parts of the groceryman's business and it is just to the extent to which he understands and undertakes the performance of all duties included in the groceryman's line that he will become valuable. A trip to his competitors' stores picking up all points in which the latter are stronger will add to his stock of knowledge. The groceryman will quickly recognize his assistant's strength or weakness; quicker than will the same qualities be known in the railroad employee. This is due largely to the necessary routine in railroad methods, to limitations of the labor organizations and frequently to inability on part of the superintendent "to get around oftener and stay longer among his men and know their characteristics in the old-fashioned way," as alluded to in the last paragraph of your editorial.

Stress is laid on the importance of "inspection and punishment and teaching" in connection with proper observance of signals by enginemen. In these days of heavy and increasing traffic, accompanied by the more general use of block signaling and in view of the recent recommendation of the Interstate Commerce Commission that roads be compelled by law to equip their lines with block signals, the consideration of this question is vital. The writer has charge of a long, automatically signaled division with comparatively heavy traffic. He has never resorted to surprise checking and feels safe in asserting that the observance of signals on his line is practically absolute. It is understood that signals must be respected and it is known that for failure to do so the penalty is invariably dismissal. He has enlisted the assistance of nearly all officials on his division in noting the engineman's observance of signals. The results are largely attained, however, through the watchfulness of the men who have charge of the maintenance of the signal system. These men—repairmen, battery men, etc.—realize that they are responsible for the successful operation of the signals. They understand that successful operation, in addition to proper maintenance, carries with it the attainment of the purpose for which the signals were installed—the prevention of accidents. From the head of the signal department down, they feel that their honor with the reputation of the signal system is at stake. At the same time, no opportunity is lost to impress the engineman with the fact that the signals are used and their observance insisted upon largely for his own protection. It is impossible for an engineman to know the whereabouts of these signal maintenance men, and as they spend a large part of their time on the road at night, there is but one thing for the engineman to do—stop for signals in the stop position; and he does it.

FROM THE GENERAL MANAGER OF AN EASTERN ROAD.

The question of discipline has always seemed to me one of the most troublesome that an operating officer has to contend with. When I was a Division Superintendent, I knew personally every man on my division, and had my own ideas as to each man's capacity and worth. An organization ought to be such that a pretty close personal relation can exist between the rank and file and the officers to whom they report. Some large railroads, in late years, have undertaken to cut down the staff considerably; this, I believe, has not been to the advantage of the road. Of course, a general officer cannot have personal acquaintance with a large number of employees, but he ought to have such an organization as will afford personal contact with all the men, through not more than one of his subordinates. I do not much believe in setting traps for men; it is apt to produce ill feeling and uneasiness. Discipline, or punishment, should be sure for infraction of rules; should be impartially inflicted, and always after full consideration, and without temper.

Like everything else, railroad service to-day is getting to be highly specialized. We do not often find men to-day who have an all-round experience in the various departments of the service, as was quite common twenty-five years ago. The great increase in labor-saving devices, and in mechanical safeguards, has weakened the sense of responsibility. Prompt discipline is not as common as it was in the past. The best remedy is to cultivate a spirit of loyalty on the part of the rank and file, which can be done by affording them absolutely fair and impartial treatment; by enforcing reasonable rules, patient

hearing of all grievances, and establishing an organization that will put the management in touch with every subordinate.

FROM A SUPERINTENDENT ON A SOUTHERN ROAD.

On reading your interesting editorial of April 8 on Discipline it occurs to me that the recent enormous increase in business, with inadequate facilities, has caused us to devote our attention principally to getting the business moved, and avoiding congestions; we have not given a reasonable amount of time and attention to the proper education of the men. The increase in business has necessitated rapid promotion of men in the ranks, and while it is true that we have required periodical examinations, it is a fact that the trainmen, as a class, have in the past few years deteriorated. This must be due in a measure to rapid promotion.

The Division Superintendent should not have too much territory. He should have sufficient assistance to enable him to spend the major part of his time on the road, in close contact with the men. This brings about the best results.

I have tried the surprise testing in signals and, notwithstanding the fact that Trainmasters and other Division Officers were sure the rules were being complied with, I found the contrary to be true; as shown by the test.

Reinforced Concrete.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The rather common use of three different terms or names for a certain material used in construction seems contrary to good practice, particularly among engineers. It should not be difficult to decide between "reinforced concrete," "steel-concrete" and "concrete-steel," since only the first correctly describes the material. Reinforced concrete also corresponds more nearly with those terms now in use by the French and Germans, and would seem more desirable.

The Masonry Committee of the Am. Ry. Eng. and M. of W. Association has recommended the general adoption of the term suggested, and would invite co-operation to that end.

E. C. BROWN,
Chairman of the Masonry Committee.

[The making of language is always a dangerous undertaking. It has commonly been left to the slow development of common usage, but in choosing engineering terms the first responsibility rests on the specialists. Shakespeare suggested a good while ago:

"The dreadful Sagittary
Appeals our numbers; haste we, Diomed,
To reinforcements, or we perish all."

If the Masonry Committee will see to it that the word is correctly spelled, with an i, we shall be glad to co-operate.—EDITOR.]

International Accident Statistics.

Alice Holt, Farnham, Eng., March 28, 1904.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Having, so far as I know, an ear equally attuned to the roar of the British lion and the scream of the American eagle, I should like, with your permission, to say a few words as to Mr. Slason Thompson's contentions in your issue of February 26, and your comments thereon. The subject of international comparison of railroad accidents is one that has interested me for a good many years past, and was brought to my attention in a special manner in 1899, when, as a member of our Royal Commission on Accidents to Railway Servants, I spent three months of the summer traveling over the United States from Portland, Me., to Portland, Ore.

In the first place, I think Mr. Thompson is somewhat unfortunate in his arithmetic. He says that you have nine times our mileage. His own figures are 276,510 and 34,502 respectively. This, according to the multiplication table as taught in this old-fashioned country, is eight times, not nine times. Further, Mr. Thompson's American figure is obtained by including 58,220 miles of yard track and sidings. Because the corresponding figures are not published for England—I am glad to have reason to believe they will be published in the near future—Mr. Thompson erroneously assumes we have no yard track and sidings here at all, and writes down the figures as nil. According to the best guess I can make our siding mileage is about 15,000 miles. The track of the two countries is therefore comparable as 275,000 to 50,000; roughly not nine, but five and a half to one.

But is this a fair basis on which to compare relative frequency of accidents in the two countries? I think not; nor would I even accept your train-mileage basis, though infinitely fairer, as sufficient. Let me take an instance: A train from Ogden to San Francisco represents, if my memory serves me right, 700 train miles. So does a train working 35 times back and forward between Liverpool Street Station in London (which deals with about 1,000 trains a day) and Enfield. Does any railroad man doubt which train needs most looking after if accidents are to be avoided? I may be told that Ogden-San Francisco is single track; Liverpool Street-Enfield double or quadruple. I reply that, under English block-signaling regulations—expensive, doubtless, but effective certainly—single-track working is no more liable to collisions than double. I submit that, if we are to compare the accident record of the two countries it should be on the basis of train mileage multiplied by train density per mile of

line. Roughly, you run 900,000,000 train miles per annum—I have not at hand very recent figures—on 275,000 miles of track; we run 400,000,000 train miles on 50,000 miles. Your train density is therefore two-fifths of ours. Nine hundred $\times \frac{2}{5}$ is so nearly 400 that the difference is not worth talking about. It seems to me, therefore, that an Englishman would be quite entitled to argue that if you brought your safety appliances and regulations up to English standard you would have—not relatively, but absolutely—no more accidents than we have. One might even push the English case further and point out that the great bulk of our accidents happen in or close to the great congested centers of traffic; that on lines like the typical American line with only some ten or a dozen trains a day, practically speaking, accidents do not happen at all. Further, one might ask whether American railroad men have any idea what it means to work without accident hundreds of crowded passenger trains in and out of a terminus with a black fog, through which a signal lamp is invisible at 15 yards, never lifting for a moment for three days on end. But perhaps enough has been said to satisfy Mr. Thompson that there are two sides to the question.

But I confess to thinking that no statistical comparison between the two countries is really of any scientific value. The conditions are too different; we do not even use the same word to mean the same thing. Mr. Thompson, for instance, uses "train accident" to mean, apparently, an accident connected with the movement of a train; with us it means an accident to the train itself. If we must compare, let us try to compare, as far as may be, like with like. Compare, in the first place, not all America, still less the Western states, but rather New England with Old England. Secondly, eliminate all accidents other than those concerned with operation. Our roads are differently built from yours; our climate is less severe; we know nothing of burnt trestles, washouts and the like; accidents due to defective permanent way and works are almost negligible here. With you it is not so. Not all the genius of American railroad men can make your dollar go quite as far as our sovereign. Thirdly, and especially, compare on the basis of persons "killed" only, not of those "killed and injured." The definition of injury varies greatly from country to country, and even in the same country all the railroads do not always live up to the definition. Some years ago the London & North-Western Railway, then, as now, the *bête noire* of the railroad trade unions, was held up to obloquy as having more accidents among its employees than its neighbors. Investigation showed that it had only been more careful to conform to the official requirements as to notification of trifling injuries. Similarly, the Prussian Minister of Public Works once claimed that Prussian railroads were safer than English, but his claim was based on statistics which showed several times as many injuries for each death in England as were shown in Prussia and clearly the tables were not comparable. "Killed," on the other hand, is a pretty definite fact; though even here there is room for some discrepancy. In England, if a man dies from the result of an accident six months before he is reckoned "killed;" in Germany I believe deaths are not reckoned unless they are reported within 24 hours.

Apart from statistics, I cannot believe that any unbiased person who knows both countries seriously supposes that railroads are worked with as few accidents in America as in England. It would be curious if they were—if the special American characteristics of unyielding determination to attain a desired end somehow, cost what it may, were lacking in the most typical of all American occupations.

One word more. Mr. Thompson twists the tail of the British lion rather hard when he says that Mr. Tunell has "demonstrated" "the overwhelming superiority at every point of the American train service." I regret not to have seen "the demonstration;" it ought to be most interesting. Would it be too much to ask the *Railroad Gazette* to find space for a list (I care not whether Mr. Tunell or Mr. Thompson be the compiler) of the express runs of 100 miles and upwards without a stop which demonstrate the overwhelming superiority in this particular of the States over this poor little island that at the date of the last compilation only had about 170 such runs per diem.

W. M. ACWORTH.

Chicago & Alton Rules for Telegraph Block System.

The introduction of the telegraph block system on the Chicago & Alton was noticed in the *Railroad Gazette* of March 25, page 244. This system will go into use between Chicago and St. Louis on April 17, and General Manager C. A. Goodnow has issued a code of rules for its operation. This code is, in general, like that on the Chicago, Milwaukee & St. Paul, printed in Adams' *Block System*, except that the rule requiring an operator immediately before starting a train on single track, to get permission from the office at the farther end of the section, applies to all movements, instead of applying only to movements in one direction, as on the St. Paul. On the St. Paul road eastbound trains have the right to the road, and operators send them forward without inquiring whether or not a westbound train has entered or desires to enter the section. We note the substance of the more distinctive rules of the Chicago & Alton code.

Rule 2; Block signals are also used as train order signals. Rule 3 forbids a train to pass a block signal at stop except (1) with a clearance card, or (2) a permissive card, or (3) to do work at stations, or (4) to enter a siding, or (5) to cross over (on double track). While

the signal indicates stop, the train must not leave the station without an order, or a clearance card, or a permissive card.

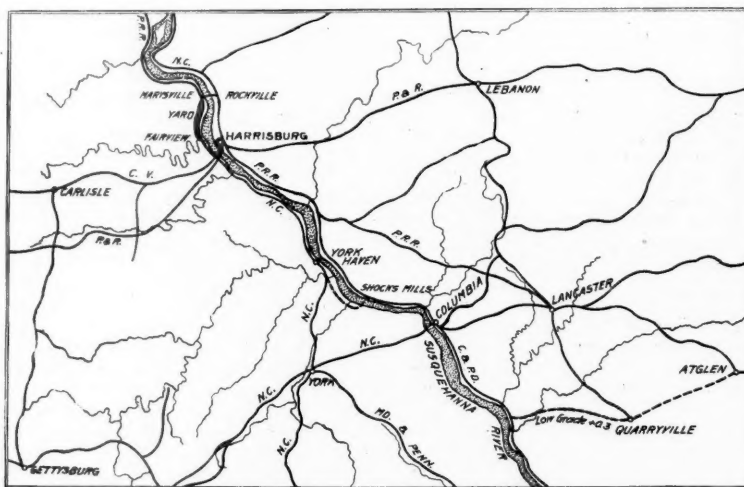
Rule 4 provides that if a conductor receives a clearance card stating that the signal is at stop for his train, he must, before going, have a permissive card also; and a permissive card is never good without a clearance card also. Cards do not permit a train to go if the time-table or special orders held by the conductor forbid it to go.

Rule 8 provides for the use at certain stations of a

permissive arm on the signal, doing away with the necessity of permissive cards. Rule 46 requires operators to wait until the last car of a train has passed 500 ft. beyond the signal before reporting a block section as clear.

The Fairview Yard, Northern Central and P. R. R.

In the last report issued by the Northern Central, comment was made on the extensive betterments to the line with a view to providing additional double track, yards, and other terminal facilities at different points, but especially between Fairview and York Haven, in connection with the improvements now being made by the Pennsylvania for the purpose of providing an additional line for the movement of coal destined to tidewater points. A very large traffic is thrown upon this section of the Northern Central, and in order to accommodate it the



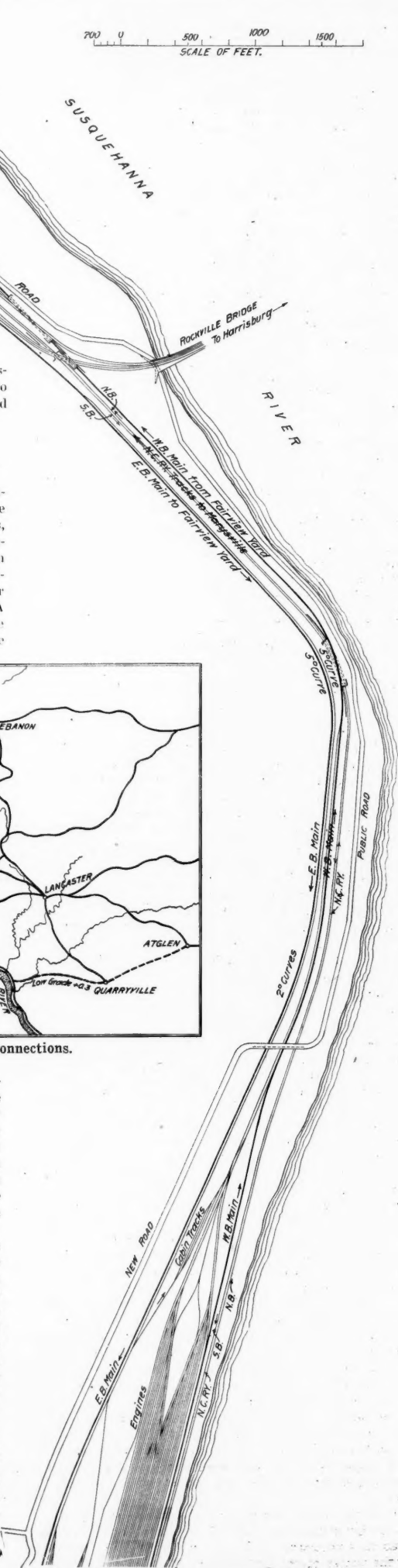
Location Map to Show Fairview Yard and Connections.

road has been four-tracked from York Haven to Bridgeport, and the yard facilities at Fairview across the Susquehanna River from Harrisburg, have been so greatly increased that the result is practically an entire new yard of very large size. The cost of this yard, which is built jointly by the Pennsylvania and by the Northern Central, will be divided between these two companies on an equitable basis, but the expenses already incurred have for the present been defrayed by the Pennsylvania to the extent of about \$2,000,000.

The primary purpose of the Fairview yard is to relieve a serious congestion which has hitherto existed in the Harrisburg yard, and the four-tracking of the Northern Central takes traffic direct from the new Fairview yard to York Haven, shown on the accompanying sketch map, without its passing through Harrisburg at all. At York Haven the traffic is divided and a pusher engine takes the standard fuel train for Baltimore to the summit of the grade, which is marked with an X on the sketch map. For Philadelphia, New York, etc., the new line south and east from York Haven crossing the Susquehanna at Shocks Mills is used. This low grade line down the Susquehanna, crossing the river on a 28-arch stone bridge 2,200 ft. long, was fully described in the *Railroad Gazette*, March 11. The new line begins about two miles south of York Haven and terminates at Atglen, the total distance from Marysville to Atglen by the new route being 72 miles, nine miles longer than the main line, but with a limiting eastbound grade of only 26 ft. per mile.

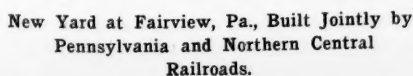
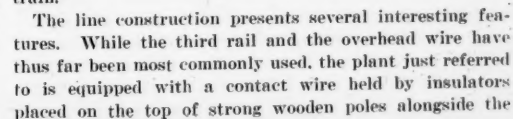
The Fairview yard contains 110 miles of track and is admirably arranged to handle and to expedite heavy traffic. As is shown in the accompanying drawing, eastbound

trains go into the eastbound receiving yard on a lead from the main eastbound track, which continues around the yard for the benefit of through traffic. From the receiving yard the engine continues east to the end of the eastbound classification yard and then backs down to the turntable and proceeds to the westbound engine storage tracks. Here it can go to the west end of the westbound classification yard and back to its train which is to be pulled out westbound. The convenience of certain features of the yard arrangement will be at once apparent



New Yard at Fairview, Pa., Built Jointly by Pennsylvania and Northern Central Railroads.

In the meantime it may be well to realize that, while in America direct-current motors have thus far had almost absolute sway, there are in Europe several railroads which have been using three-phase alternating-currents on a large scale for a number of years (see my paper on poly-phase alternating-current traction in Europe, read at the annual meeting of the American Institute of Electrical Engineers, May, 1902). The data and experience gained in the construction and operation of these roads is of



*Mr. de Muralt, although born in the United States, has done most of his professional work in Europe. As chief engineer of the railway department of Brown, Boveri & Co., of Baden, Switzerland, he had charge of construction of Burgdorf Thun railway, 25 miles; the Stansstad Engelberg railway, 22 miles; the Jungfrau railway, and a number of other alternating-current electric roads, all with a record of several years' successful operation.

track. The current is collected from this wire by means of a curved brass rod which is pressed against the contact wire from above and which is so arranged as to automatically follow all variations in the position of the wire. Thus, when the wire is brought over the center of the track in tunnels, the rod, after having turned an angle of almost 180 degrees, makes contact from below. This arrangement of the contact wire at the side of the track causes the least possible change of the present roadbed and makes it possible to erect the line wire without interference with the present steam traffic. By placing a contact wire on each side of the track a very effective reserve may also be established, so that even in case of breakdown of one line, traffic will not be stopped. The locomotive used during these experiments was also of a unique type, inasmuch as the single-phase current was converted on the locomotive into direct current and the latter fed to the motors driving the wheels. By feeding the single-phase current direct to the driving motors a saving of about 6 tons in the weight of the locomotive might have been made. On the other hand, the use of the converter on the locomotive permits of a very efficient speed regulation, and the control of the locomotive in starting, accelerating, varying the speed, breaking electrically, stopping and reversing, was accomplished during the tests in the most satisfactory manner simply by turning a small hand wheel, which regulates the exciting current of the converter. A further advantage of this arrangement lies in the fact that existing power stations can readily be called upon for the supply of the necessary electric energy, because the converter can be made to transform practically any known kind of current into direct current suitable for the driving motors.

All in all, this latest development in heavy electric traction is worthy of serious attention. By these means the cost of the line equipment is reduced to a minimum and the traffic can be handled in exactly the same way as is now customary with steam locomotives, with the additional advantage that the trains may be made considerably heavier and can be run at higher speeds if

has been condemned. I have known an inspector to praise the quality of lumber that had been chalked by him as defective after it had been run through the planer to take the chalk marks off.

The favorite method of covering defects of wood and iron in this business is putty and paint for wood and soap and plumbago for iron; but since the advent of two or more inspectors on a contract this has to be done very cautiously. Men used to get so expert in plugging castings that when the good and the bad were mixed together they themselves could not tell which was which. Iron axles were especially watched by the inspectors. The roughing cut across the journal would sometimes show a crack or cold shut but a vigorous peening of the crack before the smoothing cut was taken would generally make it finish smooth and nice. If the crack was too big then a little lead or babbitt metal or a bright shaving from the axle was used to good advantage. This saved time and the cost of a new axle and the inspector, unknowing, congratulated himself on what a good job was being done when he ran his hand over the smooth, bright journal.

A smooth way to get a condemned sill through was once worked on an inspector and he never suspected the trick. He had ordered a bad sill taken out of a car and the superintendent promised to do it at once. That night the change was made, but instead of the body builders doing the job, the paint gang got the car ready. They selected a car ahead of the condemned one standing on the same track in the paint yard and erased the numbers on both cars, renumbering them in reverse order. Then they switched them around on the track, the bad one ahead and the good car behind. The inspector was delighted the next morning and said he had never seen a neater job of sill changing done.

Inspectors are generally very particular about grab irons. One of them was making his rounds through the blacksmith shop and stopped at a punch where a pile of grab irons lay that had cracked on the under side of the foot in punching. He took pains to look the pile over carefully and finding them all cracked (they had been con-

One of the neatest jobs I ever saw carried out was on a lot of cars where it was specified that the oil-box bolts should be double nutted. The bolts were got out for a single nut and were two threads too short for even that. The inspector raised a row after about 25 or 30 cars were up, so the foreman promised to have them changed the next day. Next day was Sunday and the inspector had gone home the night before, so they proceeded to cut threaded pieces long enough for the purpose and turn them into the threads of the nuts on the short bolts. A second nut was run on the extension piece and turned up tight against the bottom nut, making to all appearances a double-nutted bolt. The inspector never knew the difference and the company saved the cost of new bolts and taking the trucks out from under the cars to put them in.

Sometimes in finishing a job a good many malleable castings get mislaid, lost and broken. We always began invoicing these castings a month before the end of the job and if any were missing the superintendent would have a pattern made and enough gray iron castings made from it to make up the difference. These were put in the heating furnace, covered over with burnt molding sand and the night watchman told to keep a fire going on them all night. We would do this on Saturday and let them cool off slowly over Sunday. Monday morning when they were taken out the castings would be very soft and would pass for malleable nine times out of ten. Leaving out bolts that won't be noticed, from two to eight a car, cuts quite a figure on a 500-car contract. The nuts are generally scant in thickness from $\frac{1}{16}$ in. to $\frac{3}{32}$ in., and this is another item of saving.

Mallet Articulated Compounds for the Siberian Railroad.

Two types of Mallet articulated compound locomotives for the mountainous sections of the Siberian Railroad are shown herewith. The gage of the road is 5 ft. The passenger locomotive, Fig. 1, has eight driving wheels and

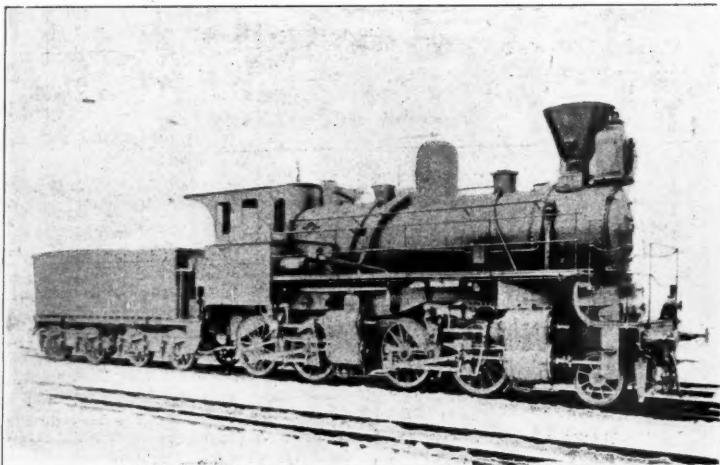


Fig. 1.—Passenger Locomotive of the Siberian Railroad—Mallet System.



Fig. 2.—Freight Locomotive of the Siberian Railroad—Mallet System.

desired. In the course of an investigation carried out for a western road a little over a year ago I recommended the use of similar converter locomotives in connection with ore trains of 3,000 tons weight. Calculations made at that time led me to the belief that not only will the savings predicted by several well-known engineers for electrically operated passenger trains be realized, but similar and probably greater savings can be effected if heavy freight trains were to be hauled by electric locomotives. In general, the statement will hold good that electricity can be used as motive power to advantage in all cases where a road shows a minimum traffic of six fair-sized trains per day in either direction, provided, of course, the electric energy can be produced at a reasonable figure.

The Shady Side of Car Building.

A correspondent, once a car builder, sends us the following personal recollections of his experiences in a contract car-building shop. The deceptions and underhand methods he tells of may not be practised now, but they are interesting nevertheless if only because of the frank, unabashed manner of their telling. When railroad men are gathered together at the noon-hour on the sunny side of the roundhouse or are lounging around the stove in the caboose of a local freight held up at a siding they swap such stories as these:

The old saying about tricks in all trades applies to all to a certain extent, but, from observation of different things I have turned my hand to, I think there is none where more ingenuity, craftiness and diplomatic generalship is exhibited than in car building by contract. The tricks of the trade are pretty well known nowadays by the general run of car inspectors selected by the big roads, but the best of them get their bumps now and then. In a big shop where they have to inspect 30 or 40 cars a day it is a hard matter to catch all the defects, especially where great pains are taken to cover over these defects in as smooth a manner as possible. Of course, the company sometimes gets it in the neck, but in the long run it generally gets the biggest slice of the pie by working in material that

demned by the punchman) he walked out in the yard and proceeded to make the grab irons on all the finished cars standing there a lurid color with his red chalk. When the foreman expostulated with him and insisted that they were not defective, the inspector wanted to be sighted, so the foreman had one taken off to convince him. It just happened that that one too had a slight crack and he gave orders not to put on another one. It was not until the superintendent came along and had two other cars stripped to prove that the grab irons were all right that the inspector relented and took the marks off of all the cars he had condemned, but he kept a close watch thereafter.

On one job we had it was specified that the body bolster plates should be drilled and not punched. The plates had about 40 holes in them and as our facilities for drilling were very scant we decided to drill part of the holes and punch the rest, including the center pin hole, $2\frac{1}{4}$ in. in diameter. This was done at noon when the inspector was out to dinner. Enough plates were punched to last for the day and they were piled up with a few drilled plates on top. The scheme worked all right until the inspector caught the punchman in the act. His excuse was that he was just laying out a plate for the drill man. There were no more punched bolster plates on that job.

The company got the worst of it on one deal when it got up against an inspector from a western road who had a large capacity for tarantula juice. The superintendent wanted to work off some old siding that had been condemned and knowing the inspector's failing took him up-town one afternoon to pass away a few hours while the boys could use up the siding. The treasurer and the president of the company were asked to come along too. The red eye was passed around and around until the company began to wobble and have difficulty in making themselves understood. Our friend from the West seemed to get better all the time and talk more voluble until the three schemers were knocked off their pins and had to be taken home in a hack. Then the inspector went back to the shop, made them tear the siding off the two cars finished while he was gone and saw that sound stuff was put on instead.

a pony truck. The engine hauls trains weighing 300 long tons, exclusive of engine and tender, at a speed of 20 miles an hour on grades of 1 in 60. Trains of 480 tons are hauled on grades of 1 in 100 at a speed of 20 m. p. h.

The freight locomotive, Fig. 2, has 12 driving wheels and hauls trains weighing 500 long tons on grades of 1 in 60 at a speed of 10 to 12 miles an hour.

About 40 passenger and 80 freight locomotives of the above-mentioned types are working or are being built. The engines are designed to burn wood and it is said that both types have been found economical and efficient during three years' service. Walschaerts valve gear and piston valves are used. The photographs and details for the above description have been furnished by A. Mallet, Paris.

A list of the principal dimensions of these engines is given by the following table:

	Passenger.	Freight.
Builders	Kolonna Wks.	Pontiloff Wks.
Wgt. on drivers, lbs.....	123,000	181,000
Wgt., total, lbs.....	141,300	181,000
Wgt. tender, loaded, lbs.	100,000	112,000
Wheel-base, total, ft. & in.	26'-6 $\frac{1}{2}$	23'-3
Wheel-base, rigid, ft. & in.	5'-7	8'-6
Htg. surf., fire-box, sq. ft.	124.5	155
Htg. surf., tubes, sq. ft....	1,766	1,871
Htg. surf., total, sq. ft....	1,890.5	2,026
Grate area, sq. ft.....	28	37.6
Diam. of drivers, in.....	53 $\frac{1}{4}$	47 $\frac{1}{4}$
Diam. of truck wheels, in.	35 $\frac{3}{4}$
Cylinders, in.	16 $\frac{1}{2}$ & 24 $\frac{3}{4}$ x23 $\frac{3}{4}$	18 $\frac{1}{2}$ & 28x25 $\frac{1}{2}$
Working pressure, lbs....	175	175
Tubes, number	220	265
Tubes, diam., in.....	2	2
Tubes, length, ft. and in.	15-3 $\frac{1}{2}$	14-9
Tractive effort, lbs.....	21,000	32,400

A cable despatch from Guatemala says that the Guatemala Congress has ratified the Van Horn-Keith concession for building and managing the railroad from Puerto Barrios to Guatemala City. The railroad is to be the property of the contractors for 99 years, and the government is to purchase the road at the end of that time at a sum mutually agreed upon.

Performance of Automatic Block Signals Under Unfavorable Conditions.*

BY H. S. BALLIET.

II.—RELAYS AND THEIR ENCLOSURES.

The operation of automatic block signals involves the use of electro magnets with arms or armatures, commonly termed relays (similar in design to those employed for telegraph purposes). These are used to open and close suitable contacts in the electrical circuits which perform the various functions. These contacts consist, first, of levers or arms, usually termed fingers; and, second, of contact arms in the form of an anvil or a spring. The fingers are attached to the armature plate, and they close the circuit by touching the spring, which is fastened to some immovable part of the relay. The finger is fastened to the armature plate by screws passing through rubber, mica or other suitable insulating material. Bone is used in some relays, being threaded so that it can be fastened to the plate. As a general rule, the finger is made of aluminum with a platinum contact point. It is desirable to keep the weight of the armature plate reduced as much as consistent so that it may be readily operated by its magnet. The anvil is a spring as well as a contact, some tension being required to insure a good connection.

These contacts must be of a material which will insure low resistance; they must not wear, for wear results in particles lodging between the contacts, making a resistance to the current. On many relays both the finger and

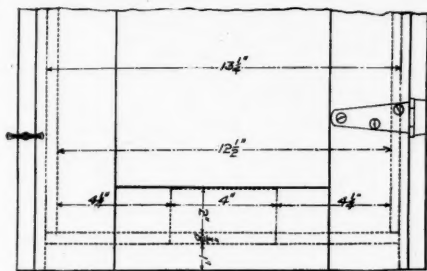


Fig. 1.—Wooden Relay Box.

the spring have platinum contacts; others have platinum on the finger with carbon on the spring; in a few cases, the finger has a carbon roller and three or four platinum contacts are attached to the spring.

Platinum being a good conductor, only a platinum contact is made small; but what is gained in conductivity is lost in its tendency to readily gather moisture. Winter or summer, when sudden changes in temperature take place, moisture will be found collected on platinum surfaces. If this moisture is collected in the winter, it is frequently frozen into ice insulating the contacts one from the other, and interrupting the proper working of the signal.

A piece of carbon mounted on a German silver spring or other metal is a poor conductor for low potential circuits, and not infrequently causes mysterious train-stops owing to its uneven and granulated surface. To overcome this difficulty such contacts are plated with a very thin layer of silver or copper. This design of contact is far less susceptible to changes of temperature and humidity than is platinum. When carbon rollers are used, they are not silver plated. There are in service a large number of carbon contact springs without the plating; it is on this design that practically no moisture collects. When this design of contact causes interruption to the circuit, it is traceable to the precipitation of moisture on the platinum contact finger, which it is necessary to use to reduce the resistance of the contacts. When the

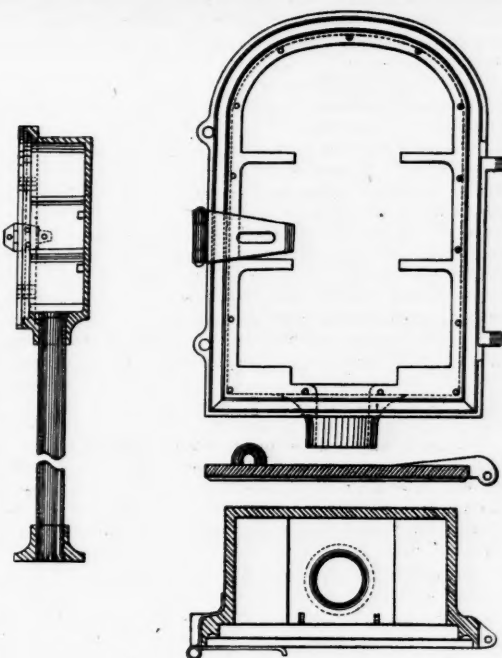


Fig. 2.—Iron Relay Case.

carbon is not plated, the resistance is so great as to make it necessary to connect not less than two fingers and springs in multiple.

A number of relays with aluminum contacts (both finger and spring) have shown remarkable freedom from precipitation of moisture. This test was employed in extreme frost conditions in both wood and iron enclosures. The only trouble with aluminum contacts is their tendency to become dirty from sparking. With good inspection, these contacts can be made to work without failures. But some new metal or combination of metals

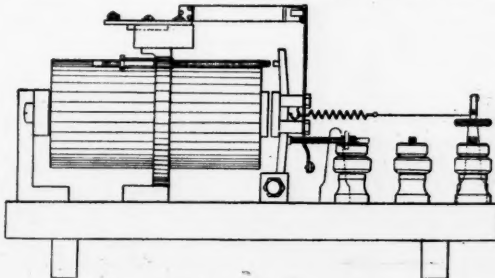


Fig. 3.

ought to be tried for contacts, all thus far tried having proved unsatisfactory in one way or another.

While the question of the contacts of relays is vital and furnishes food for serious thought, we must not lose sight of the "air gap," which separates the armature from its magnets or pole pieces. The precipitation of moisture on the pole pieces and armature plates is considerable. When this precipitation occurs just before a fall in temperature, the moisture is frozen into ice.

Very few relays now in service are placed so that this

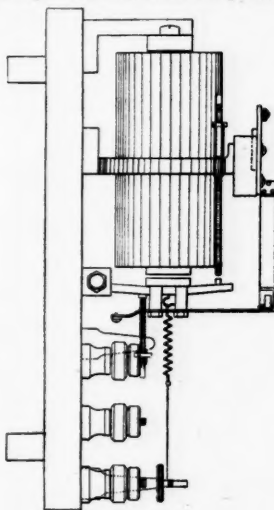


Fig. 4.

moisture can drop down between the pole piece and its armature plate, before it freezes. The surface of the side of the plate being horizontal, this moisture, when it freezes, seals the plate to the pole piece. Then, again, on many relays the air gap is too small.

The general practice is to so arrange the armature plate with reference to its pole pieces that it drops away from them by gravity when the magnet is de-energized, as in Figs. 4 and 5. There should be a greater gap between pole pieces and armature plates. The pole pieces should be smaller or of a different shape, and all relays should be set (as in Fig. 3) so that moisture cannot be held between pole pieces and armature plates. This is a

radical departure from present practice, and it will necessitate the employment of some new arrangement whereby the armature plates can be withdrawn from their pole pieces by gravity, because it is not wise to depend entirely on springs to do this work.

More freezing of armature plates to pole pieces occurs where relays are enclosed with glass covers placed over the contacts and magnets than with those having no cover. This is not difficult to understand. Where covering is employed, there is an absence of circulation of air, and, consequently, as described in a previous article, the moisture cannot be absorbed by the air. If these relays were built so that there could be a vacuum around the parts named, then moisture would make no trouble.

A great deal of the trouble with relay contacts and armatures is due to the character of the design of the case or enclosure. Relays in the bases of iron signal masts, wherein are also contained the mechanism operating the signal suffer from frost. This condition is caused by the same circumstances which disturb the other mechanism, as described in previous papers.

On a certain installation of 15 miles, where iron masts are in service, the relays for two winters were located in wood relay boxes (Fig. 1) attached to the iron signal mast; and not a single case of interruption of their proper operation was noted. Since that time, these relays have been put into the iron case located at base of the iron signal mast, and there have been interruptions. Where these wood relay boxes are in service for the control of disk signals, and for repeating from one track section to another, where, as a rule, they are attached to telegraph poles, it is rare for the contacts to become coated with moisture; and no case is known where there was enough moisture to interrupt the proper operation of the armature plate.

There is in use an iron relay case (Fig. 2), sometimes with and sometimes without wood lining. A large number of failures have occurred in these cases due to frost

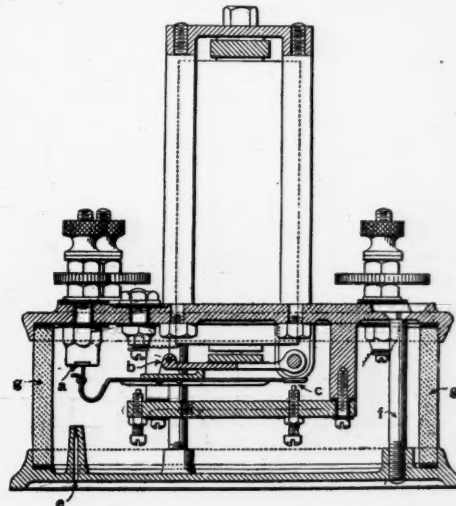


Fig. 5.—Enclosed Relay.

and ice forming on the relay points. Where relays in iron relay cases, with a wood back lining, have been transferred to wood cases, a marked improvement has been noted.

Where relays are located in surface battery houses or in "banjo" signal cases, there is no trouble from interruption.

From all these experiences the conclusion is warranted that all relays should be contained within wood enclosures.

Relay magnet terminals corrode and break where the wire passes through the fibre or rubber end pieces. The life of these terminals on relays located in wood enclosures is about three times greater than on those in iron enclosures. This seems to be due to the continual precipitation within iron enclosures. This precipitation is about as great in the summer as in the winter. When these terminals lead through bone or similar insulation and no rubber is used, their life is much prolonged. These conditions have been overcome to some extent by using shellac, varnish or paraffine to seal the terminals at the entrance to the magnet.

High Speed Tool Steels.

At the sixth annual convention of the National Metal Trades Association Mr. Wm. Lodge, of Cincinnati, Ohio, read a paper from which the following extracts are made:

To obtain full benefit of high-speed steels it has become necessary, in order to equalize all the conditions, not only to redesign the machines themselves, but also to rearrange the old methods of both holding and driving the work. New methods of mounting and holding, as well as dressing and grinding the tools are demanded, and while this may not apply so very seriously to small jobbing shops it is one of the most significant questions that manufacturing concerns have to deal with. Manufacturing establishments that formerly got along reasonably well with the old methods of handling, storing, distributing and succession of the work in course of construction, will find it necessary to make a complete change in order that the various processes may uniformly keep abreast with each other in the rapid movement of the work going through the factory. The stock room man must be in evidence, as

*Previous articles on pages 137 and 242.

must the receiving clerk, the routing official, for routing the work through the establishment and the conveying system for delivering the goods from the yards to the cranes of the shop and for rapid distribution to and from the various machines. Better arrangements must be had for laying out tools, leaving more space for work-around them.

In testing some of the machines designed especially for high-speed work our company has expended thousands of dollars in order to determine just the kind of drive that must be applied where motor drives cannot be used and we have met with many and great surprises in conducting these various experiments.

The old-time thrust bearing is found to be a great barrier to the use of high speeds. New designs have become necessary in order to obtain means of applying the power so as to deliver it to the cutting tool with the least possible expenditure in friction. In conducting these several experiments we used a 30 h. p. motor with an ammeter attached (so that the power could readily be read by observing the finger of the ammeter) and found through the mere matter of friction alone a loss of more than one-half of the horse power. If sufficient speed is applied to the old style design of engine lathe to take advantage of the high-speed steels, the friction of the cone pulley on the spindle and the thrust bearings and centers consumes enough power to make the power plant inadequate.

Then comes the necessity of testing the value of the

I have seen, within two weeks, a lathe running 29 hrs. at 270 ft. per min., reducing bars of steel $3\frac{1}{4}$ in. in diameter to 3 in., sufficiently true, at one cut, to be delivered to the grinding machine, and without regrinding the tool. This created a difference in the time of machining this piece of from one hour, under the old system, down to $2\frac{1}{2}$ min., with the new, and produced a better piece of work. I have seen a tool stand up an hour on cast-iron running at 125 ft. per min. and removing scale.

Under these new conditions the machine tool maker is very often put at a great disadvantage. When the prospective purchaser becomes acquainted with some of the facts mentioned above he is immediately willing to place an order, provided the results are guaranteed, but is generally dissatisfied with the results he obtains when he gets the same machine in his own shop. The desired results may be shown to him in the works of the tool builder, but finding when he gets the machine in use that the results do not follow in his own shop he is too much inclined to lay the whole blame on the shoulders of the tool builder, who, in any event, makes only one profit when he sells the machine, while the man buying the machine could make an enormous profit each day, provided his shop was properly arranged and equipped to obtain the full efficiency of the tool.

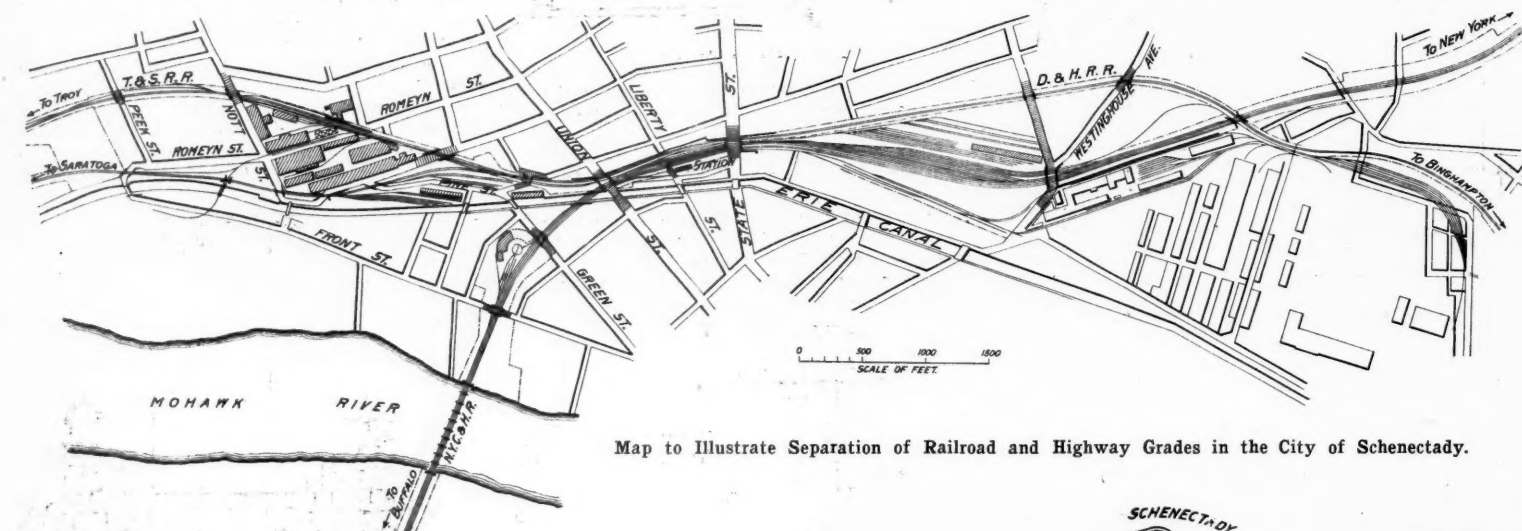
A machine was delivered over a thousand miles from the shops of the builder to a customer who, having failed in making good use of the machine, refused to pay for it, requiring the builder to send some one to revolutionize the

The Schenectady Improvements of the New York Central.

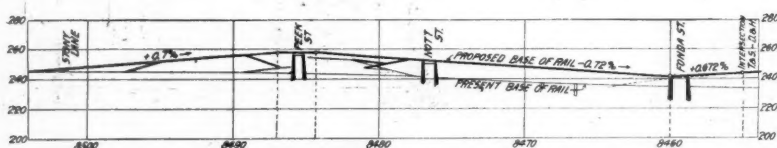
A short account was given in the *Railroad Gazette*, September 19, 1902, of the detour by which through freight traffic was to be carried around Schenectady for the purpose primarily of avoiding a grade of 59 ft. per mile against eastbound traffic. This detour has now been completed and will be open for operation within the next few days.

With the exception of 16 places on the main line of the New York Central between Buffalo and Albany, a distance approximately 300 miles, the ruling grade against eastbound traffic is 13 ft. per mile. A study of the grades exceeding that rate demonstrates that at reasonable cost they may be so reduced that a maximum train can be hauled from Buffalo to Albany without the aid of pushers. Of these heavier grades the two most important ones are the 59-ft. grade at Schenectady and the stretch from Buffalo to Batavia, a distance of about 30 miles, where the gradients are approximately 26 ft. per mile. Curiously enough, at each of these places the existing line of the West Shore division can be used to excellent advantage in reducing the grades to the proposed maximum of 13 ft. per mile.

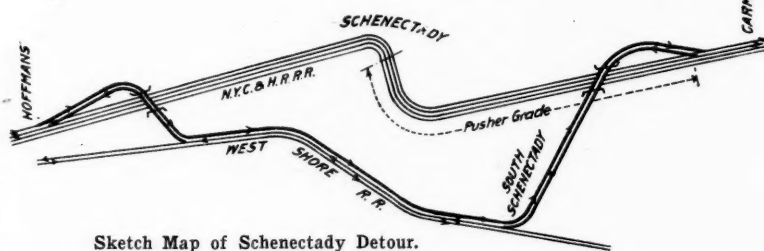
The Schenectady grade has been given first attention because of the necessity for a large number of pushers there and because of the congestion resulting from the large local traffic in the city, while the street crossings at



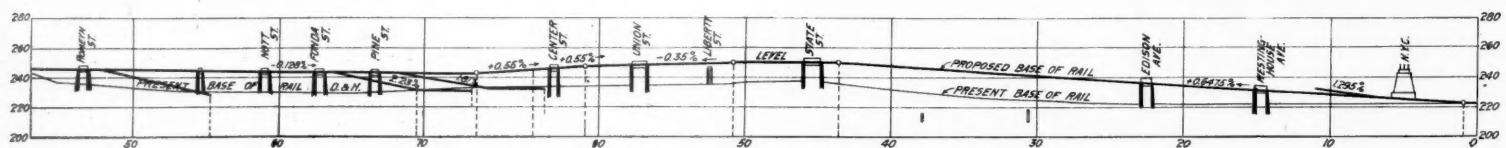
Map to Illustrate Separation of Railroad and Highway Grades in the City of Schenectady.



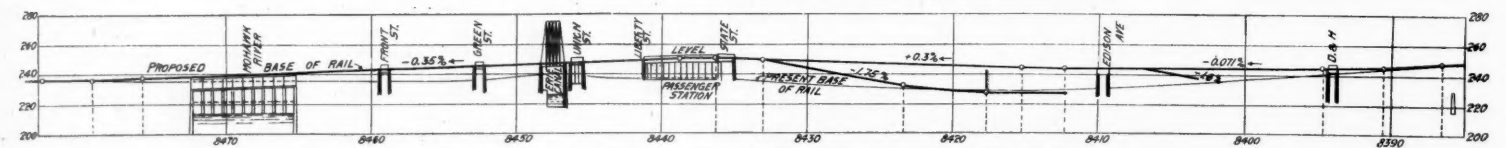
Profile of Troy & Schenectady Line, N. Y. C.



Sketch Map of Schenectady Detour.



Profile of Delaware & Hudson in Schenectady, with Tracks Raised Above Grade.



Profile of Main Line, New York Central, Crossing the City of Schenectady.

different steels, and while these have varied in the past year to a very large extent, the tool steel makers are all of them working with the utmost care and intelligence, and our later experiments have shown a wonderful improvement in uniformity and staying qualities.

It soon became apparent, while following this subject, that newer and better methods of chucking the work and of holding it to meet the strenuous conditions were necessary. The old-time bent tail dog must give way to something very much more substantial. The old methods of obtaining diameters quickly and with certainty, which consisted in the lathe hand taking a light cut, trying his calipers, then another, and another, and another, until the desired diameter is obtained, must be dispensed with; and ready means for getting correct diameters, feeds, etc., by an unskilled workman must be adopted. To a great extent, the old-time universal lathe that was good for all jobs must give way to the lathe made for its own particular work in manufacturing establishments. I do not mean by this that the ordinary type of lathe must be abandoned; it will always be a necessity; but possibly one-half of the lathes installed in the future will be designed especially for a given class of work, with all the facilities for rapidly machining the work with the least possible consumption of both labor and power.

conditions in the shop. He then refused to reimburse the manufacturer on the ground that the machines were sold to do this work and that it was the business of the maker of the machines to actually demonstrate their qualities to him in his own establishment. If this spirit is displayed very extensively it is going to stop progress.

A little difference in the hardness of the material upon which these high-speed steels work makes a great difference in the number of feet per minute at which they may be run. Ordinary mild steel can be turned all day long at 180 ft. per min. with $\frac{1}{4}$ -in. feed and $\frac{1}{4}$ -in. reduction; in fact, I have seen this done on steel of 0.20 carbon. Again we recently saw some cast-iron rolls which had formerly two and frequently three cuts, turned from the rough casting at one cut at 150 ft. per min. with $\frac{3}{8}$ -in. feed, $\frac{1}{2}$ -in. reduction and the work was nice enough to go to the grinding machine.

The deep drilling of lathe spindles of 0.50 carbon that formerly took five hours are now finished in 30 min. The former speed of 40 rev. per min. was changed when boring a 1 9-16 in. hole to 400 rev. per min., and the feed from 3-1000 per revolution to 6-1000 per revolution. It must be remembered that much more space around each machine is required, both for the stock in the rough and for the finished stock.

grade constitute a source of danger and delay. The pusher grade on the main line varies from 40 to 50 ft. per mile for a distance of about $2\frac{1}{2}$ miles, extending from Schenectady to a point near Carman. Prior to 1900 all of the eastbound traffic on the New York Central destined for the Boston & Albany, the main line Hudson division, and for Weehawken, by way of the West Shore, ascended this grade with the aid of pushers. In 1900 what is known as the Hoffman's connection was completed, connecting the New York Central and the West Shore at a point eight miles west of Schenectady, as shown on the accompanying plan and sketch map. This enabled the traffic for Weehawken via the West Shore to avoid the heavy Schenectady grade, but the large eastbound traffic for the other destinations still experienced the delay and expense occasioned by the congested local situation in the city of Schenectady, where the line crossed numerous streets at grade and continued up the inclination, where pushers were required. To avoid these troublesome conditions the Schenectady detour was built, taking advantage of the convenient location of the West Shore for that purpose.

The plan and sketch map show graphically what has been done. Starting at Hoffman's it was first necessary to reduce the maximum grade of 21 ft. per mile, which had

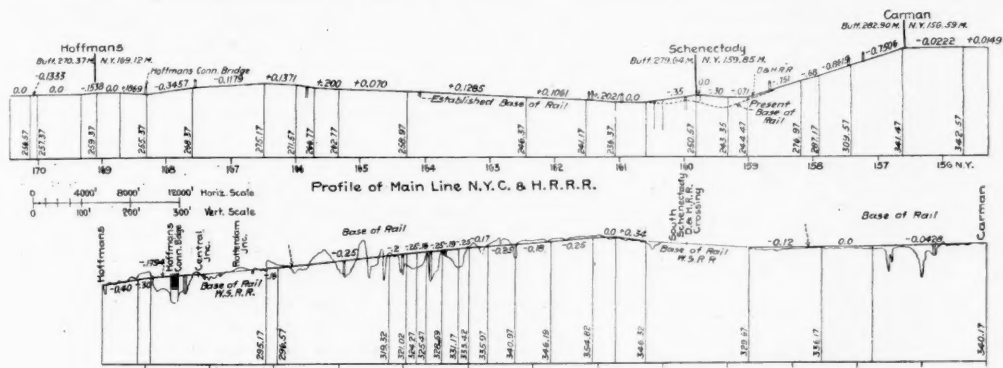
existed on the Hoffman's connection since it was built three years before, to a maximum of 13 ft. per mile. From the point known as Central Junction, where the connection joins the West Shore, a third track has been built parallel to the existing double track of the West Shore, as far as South Schenectady, and the gradients on the West Shore between these points have also been reduced to 13 ft. per mile from the previous maximum of 21 ft. Several improvements in alignment have also been made. From South Schenectady the detour leaves the West Shore and connects again with the main line by means of a new double track connection a little over 3½ miles long to the top of the pusher grade. This point on the main line is known as Carman.

The sketch map shows the general situation and also the proposed method of handling the traffic so as to avoid crossings. The direction of the arrows indicates the direction of the traffic. It will be noted that care has been taken to avoid grade crossings of all kinds, both tracks and highways. The eastbound freight traffic on tracks 3 and 4, on the main line, is diverted to the north, and then turning to the south passes above the four-track main line, the Mohawk river and the Erie canal to a junction with the West Shore at Central Junction. From Central Junction to South Schenectady all existing highway crossings have been eliminated, and from South Schenectady to Carman the railroad has also been raised so as to per-

overhead pedestrian crossing will be used at Liberty street, and there will be a long viaduct and retaining wall at the passenger station between Liberty street and State street. Raising the tracks near State street necessitates a descending gradient of 1.75 per cent. for the tracks which give access to the new freight house and team tracks on Edison avenue.

The crossing which are to be taken out on the double-track Troy and Schenectady branch are at Peek street, Nott street, Fonda street, Center street and Union street. The grade of the existing tracks will be raised, beginning at a point near Stony Lane, and ascending on a gradient of .7 per cent. to Peek street, where the new elevation is 13½ ft. above the level of the present crossing. From Peek street the tracks descend on a gradient of .72 per cent. to Fonda street, at which point the track is raised 6 ft. and the street is depressed 9 ft. The grade is then an ascending one to an intersection with the tracks of the Delaware & Hudson, and continues thence on an ascending grade to a junction with the elevated tracks of the main line near Union street.

On the Delaware & Hudson, which is a double-track line, the crossings to be taken out are at Romeyn street, Nott street, Fonda street, Pine street, Edison avenue, and Westinghouse avenue. These eliminations are effected in the manner shown on the accompanying map and, as will be seen, there are also a number of additional crossings



Profile of Schenectady Detour and of Main Line between Hoffman's and Carman.

mit all highways to pass beneath. Near Carman the new detour passes over the four-track main line of the New York Central and then rejoins tracks 3 and 4 without in any way affecting the passenger tracks.

The work on the entire detour has been executed in a substantial manner, with concrete, masonry and steel superstructure. Track has been laid with 80-lb. rail, and well ballasted with gravel ballast. Although the new line is about a mile longer than the old route, a careful analysis of the relative expenses of the two has convinced the company that a large financial saving will result in operation, in addition to the many other advantages of safety and convenience that cannot well be measured in dollars and cents. Compared with the alignment of the New York Central main line, the curvature by the detour will be increased 173 deg. and the length 1.16 miles, but the saving effected by avoiding the pusher grade amply compensates this.

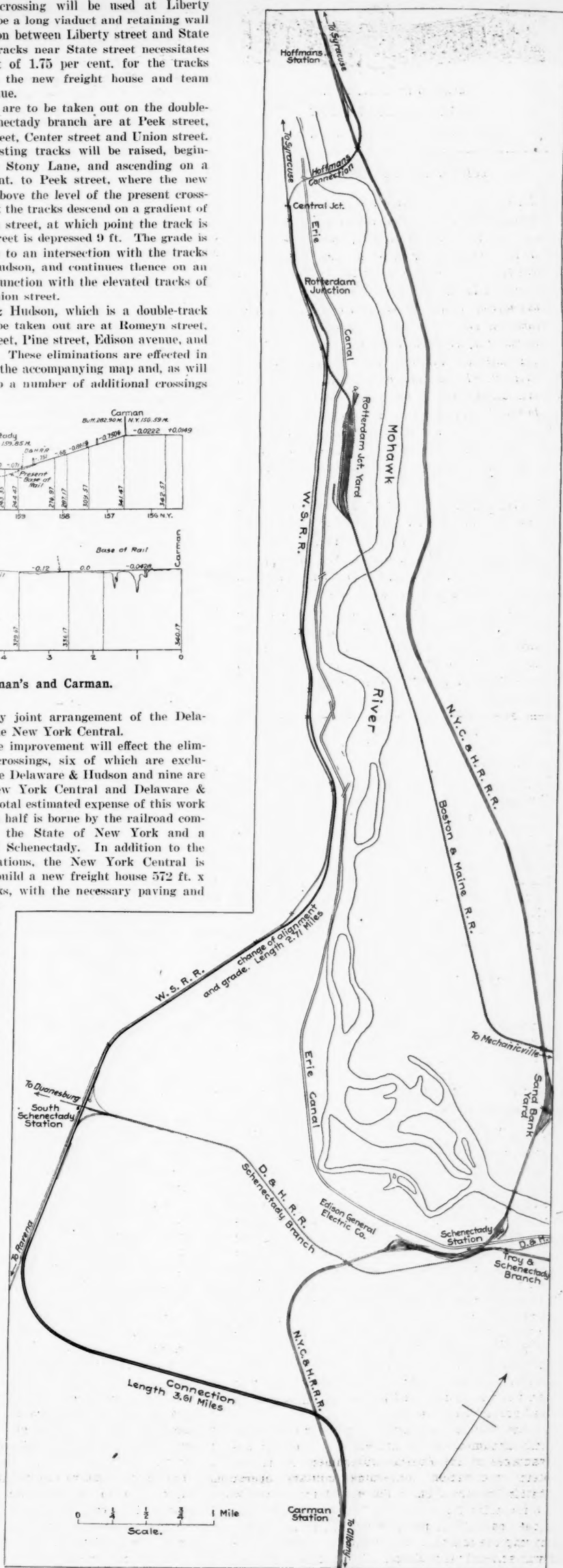
The Schenectady detour also fits in well with the comprehensive improvements to be made at Schenectady. Plans have been under discussion for three or four years with the city of Schenectady and with the State of New York for the elimination of grade crossings within city limits, and for other improvements to relieve the congestion of the local situation. The proper solution of the problem also involved the elimination of grade crossings on the Delaware & Hudson, whose tracks are adjacent to those of the New York Central. These negotiations have now been finally closed. The plans have been approved by the State Railroad Commissioners and work will be started at once.

The proposed Schenectady improvement is best classified into work to be done on the main line on the Troy and Schenectady branch and on the Delaware & Hudson respectively. On the four-track main line the existing grade crossings are at Front street, Green street, Union street, State street and Edison avenue. All of these crossings are dangerous, but the one at State street is peculiarly so owing to its location on a curve and because of the concentration of public travel there, particularly at night and morning when the operatives are passing to and from the large plants of the American Locomotive Company and the General Electric Company. By actual count, 63,000 pedestrians and 2,000 vehicles pass over this grade crossing every day. It is proposed to take these crossings out by slightly depressing the streets and the same time raising the tracks of the railroad in a manner which can be traced out on the accompanying profile of the Schenectady improvement.

Starting at the easterly end of the water troughs on the westerly side of the Mohawk river the tracks will ascend on a gradient of .35 per cent. to State street, where the base of rail will be raised 12 ft. and the street surface depressed 4 ft. From State street the tracks will descend on a gradient of .3 per cent. to a point near Edison avenue and will then run approximately level to a union with the existing tracks near the Villa road. The work involves not only building abutments and bridges at street crossings, but also raising the Mohawk river bridge and the Erie canal bridge. A subway instead of an

which will be built by joint arrangement of the Delaware & Hudson and the New York Central.

When completed, the improvement will effect the elimination of 15 grade crossings, six of which are exclusively on the line of the Delaware & Hudson and nine are on the line of the New York Central and Delaware & Hudson jointly. The total estimated expense of this work is \$1,100,000, of which half is borne by the railroad companies, a quarter by the State of New York and a quarter by the city of Schenectady. In addition to the grade crossing eliminations, the New York Central is considering a plan to build a new freight house 572 ft. x 50 ft., new team tracks, with the necessary paving and drainage, a freight storage yard, and a large concrete sewer to carry Cowhorn Creek under the new freight house and team tracks. It is proposed, also, to build a new connection with the tracks of the General Electric Company passing beneath the main line, so as to obviate the switching of the large daily traffic of the Electric Company across the main line passenger tracks of the railroad company. An eight-stall engine house is also under consideration, together with other motive power facilities, and it is probable that radical modifications of the passenger station will be made, including new elevated concrete platforms, canopies, etc. The Schenectady detour is of value in connection with these general plans as rendering feasible the proper development of the large local industries, such as the General Electric Company, the American Locomotive Company, and other important concerns, without adding to the congestion at Schenectady.



General Map of Schenectady Detour.



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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

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Russian Railroading in War Time.

The Russians in carrying on war on the Pacific Coast, more than 4,000 miles from their supplies of men and materials, all of which must be forwarded over one single-track railroad, have a problem unique in the history of war, and their success or failure in it deserves, and doubtless will receive, the attention of all students of the art of war. Before the completion of the Siberian Railroad, in the face of an enemy as powerful as Japan is now, for the moment superior at sea, it could have made practically no defence. Even if a sufficient army could have been placed in Manchuria, it could not have been supplied.

The difficulty of the problem is greatly increased by the inadequacy of the 4,000 miles of railroad across Siberia and Mongolia. Naturally, and properly, if peace could be counted on, it was designed for the very light traffic which was all that could be expected for several years at least in a country almost without population; but the western half of it, as far as Lake Baikal, was unfortunately so built as to make it very difficult to increase its capacity; for on this part of the railroad the rails weigh only about 51 lbs. per yard. Further east 65-lb. rails were laid; but under present circumstances this increases the capacity of the line but little. Naturally, in time of war, the scanty rolling stock of the Siberian Railroad is supplemented by levies on the cars and locomotives of the lines in European Russia, many of which have a heavy traffic. But 51-lb. rails and a corresponding structure for two thousand miles will hardly permit the passage of modern heavy locomotives from European Russia to the line east of Lake Baikal, where they could be used to advantage. It is true that the Russian railroads have an unusually large proportion of old and presumably light locomotives; but it is a serious matter to conduct a military traffic with engines having all the infirmities of age and spending a large part of the time in hospital. Moreover, Lake Baikal is a formidable obstacle in winter, not wholly removed by the laying of a light railroad across it on the ice.

Just how the railroad is working under these difficult circumstances is not known. One of the advantages of the Russian government is that it can keep information concerning military operations within its line from being advertised to the whole world, including its enemy. It is reasonable to suppose that something, possibly much, has been done to improve the railroad. Some two years ago, before war was seriously thought of, it had been determined to replace the 51-lb. rails with 65 lb. west of Lake

Baikal, and otherwise to strengthen the road; the wide intervals between stations, which limited the number of trains, could be remedied by the laying of sidings and passing tracks within a few weeks, if material is accessible, though not easily in a Siberian winter; and the Russians have the construction forces available which have just built the great railroad. The transportation of troops over so long a line in Siberian weather requires provisions not heretofore made in any country. Russian freight cars, like those of other continental countries, are all labeled with the number of men or horses which may be put in them in military service—usually 40 men or ten horses. But what is possible for a journey of two or three hundred miles in weather not much below freezing may be quite impossible for one lasting two weeks or more, with the thermometer 40 or 50 degs. below zero. The men must eat and sleep en route.

To provide for this, the cars used for carrying soldiers were lined with felt or felt paper; little glass windows were set in the sides, and an iron stove set up in each. The benches were made so that they could be transformed into bunks at night. At every alternate station hot water was provided for making tea. In nearly every train one car was fitted as a kitchen, and supplied the men with hot rations of meat and porridge. Shovels were carried, so that in case of a snow blockade the men could dig the train out. A surgeon and hospital steward accompanied each train. At several stations on the line camps were established, where the men rested a day, with facilities for washing, etc., while the cars were inspected and cleansed.

These were the things ordered. How far they have been carried out we probably shall not know till the war is over, when it is to be hoped that some staff officer in charge of transportation may tell about it.

Operating Hump Yards.

Nearly all of the large division and terminal yards which have been built in this country within the last ten years are operated to a greater or less extent by gravity, either with assisting grades prevailing in the yard as a whole, or with a hump or summit at one or more points over which cars are switched and allowed to run through the yard. Yards operated by gravity alone throughout their length are not in use to any extent on this side, but some few have been built in England and on the Continent. Probably the first hump yard in this country was the Honey Pot yard on the Sunbury Division of the Pennsylvania, which was built about 1890. Almost without exception, the large yards built since 1900 are operated on this principle. The one object of a yard is to provide a rapid means of collecting and classifying cars in order of destination or character of loading as they come in off the main line, and for despatching them again. This can be done with less delay and congestion in a hump yard than in a poling or switching yard. In a number of recent designs, notably the new Greenville, N. J., terminal of the Pennsylvania, and the new westbound classification yard of the same road at Altoona, the receiving yard is done away with and trains are switched over the hump at the head of the yard as fast as they come in off the line. The Altoona yard has fifteen classification tracks and is located at the east end of the long cluster of yards which extends through and beyond the town. The main line westbound freight track opens out into two tracks which are carried over the scales and hump; these form the only receiving yard. The lead switches to the ladder track are about 800 ft. from the hump and the cars run 2,000 ft. down the body tracks. The scale house and interlocking tower controlling the yard switches are located at the hump. Some fine records have been made here in handling cars both for intermittent and continuous working. On one occasion 55 cuts and a total of 88 cars were made in one hour and 984 cars were sent over the hump in 12 hours of daylight working. The best figure for 24 hours was 1,491 cars, about 70 trains, or one every 20 minutes.

Early last fall, when the nights began to be cold, considerable trouble was experienced in making the cars run out to the end of the yard. Some of the trouble was due, perhaps, to timid brakemen who set up the hand brakes too hard at first and checked the momentum gained on the hump, before the cars were fairly off the ladder track. The trouble continued and as the temperature dropped, it became more frequent, enough so to cause an investigation. At times the light cars could not be made to run up to the end of the tracks without brakes set if there was a strong head wind. The old hump had a 2.65 per cent. descending grade and from the foot on down well into the yard, the grade fell at the rate of .7 per

cent. As an experiment a temporary hump was built up with crib work filled with riprap between the old summit and the lead switch. This had a grade of 4 per cent. for a distance of 200 ft. This has been in satisfactory operation all winter and gives the cars ample velocity to carry them through the yard.

The failure of the Altoona hump yard to work satisfactorily during cold weather can be explained by two causes: First, the distance from the hump to the lead switch, 800 ft., gave the cars a chance to gain speed quickly, so that for their own safety, the brakemen began to turn up the hand brakes before the car reached its classification track. The whole yard is built on made ground, filled in last summer and, with the heaving of the track due to frost, more or less resistance at the wheel tread developed which had little or no effect in warm weather. Second, the internal resistance of trains in winter has been shown to be from 1½ to 2 times as much as in warm weather, due largely to the difference in coefficient of journal friction at high and low temperatures. Similar trouble has not been experienced to any extent in other hump yards, due probably to the fact that the tracks were in good condition and the ladder track switches passed before the car had lost momentum. The temporary hump which was built was not an expensive remedy to apply, and with the return of warm weather can be removed with little or no interference with the operation of the yard. Except for the danger of wrecks from runaway cars with defective hand brakes or careless brakemen, there is no reason why the new hump should not be kept in service permanently and the old one removed.

A study of some recent hump yard designs in comparison with earlier yards shows that the descending grade on the hump and the assisting grade in the yard has been greatly increased. Quicker operation has been one result aimed at, but the increase in momentum has also been necessary because of the lengthening of the yards. The 4 per cent. grade used on the temporary hump at Altoona is the steepest so far used, with one exception. In the new Lake Shore yard at Elkhart, the eastbound hump has a 4.3 per cent. grade, and the westbound hump has a 5 per cent. grade, both with a length of about 300 ft. This is an exceptionally long yard with a light prevailing grade of .16 per cent. which permits the steep grade used on the hump.

Restraint of Trade by American Railroads and by American Ships.

Now that the decision of the Supreme Court in the Northern Securities case has made it quite clear that all railroad combinations which suggest restraint of interstate trade in their method of organization had better turn up their coat collars and seek cover, it is refreshing to observe the wholesome and open-handed way in which the Government delights to restrain trade between the States and between the possessions of the United States, for the benefit of a single private industry. The House of Representatives on April 8 passed the Frye bill for the extension of the coastwise navigation laws to the trade between the United States and the Philippines, with an amendment postponing until July 1, 1906, the date when the coastwise laws shall go into effect. The coastwise navigation laws, in brief, limit commerce between United States ports to vessels of American registry manned by American crews. The bill seems to be a rather bare-faced violation of the basis principle of the Sherman Act penalizing any restraint of trade between the States, for the Philippines, while not constituting a State, are clearly a part of the United States, and the present laws limiting coastwise trade between the States to a certain class of ships which cannot be operated as economically as another class of ships, of course constitute a flagrant restraint of trade. But the Supreme Court was not so impressed with the beautiful possibilities attending its interpretation of the Sherman Act as to desire to appropriate the credit wholly to itself. There were divisions of opinion within the court, and even Mr. Justice Harlan, in writing the majority decision, sought to shift the responsibility for his interpretation of the Sherman Act, as in the following paragraph:

But if nothing more can be said than that Congress has erred—and the court must not be understood as saying that it has or has not erred—the remedy for the error and the attendant mischief is the selection of new Senators and Representatives, who, by legislation, will make such changes in existing statutes, or adopt such new statutes, as may be demanded by their constituents and be consistent with law.

Meantime, the coastwise navigation laws stand as an example of the beneficent kindness with which the law makers regard another kind of trade restraint, and there are many who believe that their

scope should be even wider than at present. In a current issue of the *Marine Review*, the application of these same laws to the Panama Canal zone is advocated. The *Review* says:

"The canal zone is the property of the United States, holding it absolutely by right of purchase. It is under the jurisdiction of the American Government and is part and parcel of the United States of America. Politically it is a territory of the United States and the navigation laws of the United States should be immediately extended to embrace it. American ship owners have both a moral and legal right to demand that the canal zone be included in the coastwise service, which means that commerce between one American port and another should be carried by an American ship. The astonishing statement that the last ship for the foreign carrying trade of the United States has just left the stocks and there is none to take its place, puts upon our law makers at Washington the responsibility for this great national humiliation to our American patriotism and American pride. Shipbuilding for the foreign trade is as dead as the proverbial door nail. Two splendid steamers, the "Minnetonka" and the "Minnewaska," built in sections on the great lakes and joined together at Montreal, have been swinging at their moorings representing a dead loss to their owners because there is no cargo to be obtained, and there is not an American harbor on either coast that does not contain a greater or less amount of idle American tonnage, while side by side with them can be seen many English, German, Norwegian and Italian steamships carrying not only the commerce of foreign countries, but 92 per cent. of the commerce of the United States."

It would appear, then, from this argument and from many others which are advanced with tedious frequency in the Legislature of the United States and find vehement advocates in such high authorities as the Secretary of the Treasury that commerce is to be restricted as often and as severely as possible for the benefit of ship owners, but must be jealously protected from restriction for the benefit of railroad owners. Just why this should hold is not clear, especially in view of the fact that the kind of commerce restriction which the Sherman law seems to include does not have any apparent tendency to increase the cost of transportation to the shipper. The kind of restraint always welcomed when it involves American ships provides for a very greatly increased cost of transportation to the shipper. It is so well known that American ships cost more to build and to operate than do foreign ships that it is almost idle to dwell on this part of the question. What in the world is the reason that "There is not an American harbor on either coast that does not contain idle American tonnage while foreign steamships carry not only the commerce of foreign countries, but 92 per cent. of the commerce of the United States," if it is not that these foreign ships can and do carry it more cheaply? American capital invested in steamships which have to compete with foreign vessels is notoriously unprofitable unless the American ships receive absolute and comprehensive protection throughout, and this protection for the benefit of one ship owner must clearly be paid for by a thousand shippers. It is hard to say what the advantage is to be of an American fleet supported by those who have no alternative but to use it all against their will. Can it be that the searching Sherman law has entirely overlooked this kind of restraint of trade, or is it tacitly assumed that trade which floats between its destinations, instead of being drawn on wheels cannot be so restrained as to offend the law?

The Poughkeepsie Bridge and Its Uses.

When the reorganized Poughkeepsie Bridge Company took up the bridge project again in 1886 after an interval of nearly 15 years new life was instilled into the allied railroad schemes which had been planned on both sides of the river to complete the line from the coalfields and the West into New England. All the expectations of the early promoters were to be realized at last and the monopoly enjoyed by the New Haven road would be broken up. Possibly visions of another coup such as the builders of the West Shore had carried through only a year or two before, when they had turned over their line to its competitor at a big profit to themselves, were before the new company. Capital for the enterprise was hard to get and bonds of doubtful value were issued to help eke out the required four millions needed. It was understood at the time the contract was let to the Union Bridge Company that a large part of the payments were to be made in these bonds. Before the contract was closed the contractors, in order to take no risks, had found a market for the bonds and disposed of them as fast as they were turned over.

As a great engineering project the design of the bridge created no especial interest. The length of spans had been exceeded in other bridges previously built and the amount of metal was not exceptional. The chief interest centering about the bridge was the work of building the piers and foundations and of erecting the superstructure, which was exceedingly difficult. Nominally the loadings used were for two 85½-ton locomotives followed by a load of 3,000 lbs. per ft., on each track, and most of the other bridges on the connecting lines on both sides of the river were subsequently designed for the same loads, which, for modern rolling stock, are entirely out of the reckoning. In the light of

later years the whole project seems to have been a contractor's job, built as cheaply as possible to sell as dearly as possible. Some years after the bridge was completed an attempt was made to interest a capitalist in the road from the west end of the bridge to Campbell Hall. Great stress was laid on the favorable grades and curves and substantial bridges and roadbed, but before the man who was approached took any of the stock offered he had an examination made by an engineer who reported that the line was a veritable "streak of rust," wandering around the country, up hill and down, with all the appearance of having been put in at the least possible expense to justify the claim that a railroad was there and ready for operation.

Comment was made in the *Railroad Gazette*, February 19, on the absorption of the Poughkeepsie bridge system by the New York, New Haven & Hartford, and the opinion was expressed at that time that the moral benefits of the acquisition would probably be greater than the physical ones; that the nuisance value of the property was comparable with its income value. But it is evident that the company intends to make the income value as large as possible. The bridge is to be examined and additional sway bracing will probably be put in. It is a double track structure, but according to present plans will probably be restricted in its use to one train at a time. To provide an outlet for expected traffic over the bridge, it is proposed to double-track the Fishkill-Danbury line, formerly part of the New York & New England, from Hopewell Junction, where the Central New England joins it, to Stormville, and a new bridge will be built at Towners, over the Harlem river. It is recently announced that the traffic that is now carried over the Newburgh ferry will be routed differently and sent over the bridge.

Traffic routes have now become so adjusted to delivery at New York that it is hard to realize the importance which was formerly attributed to this up-State connection. The greater part of the manufacturing country of New England has been made virtually a peninsula by the Hudson river, which cuts it off from the great western territory, where most of its manufactures are marketed (*Railroad Gazette*, Sept. 10, 1886, p. 630). It is not so strange as the map makes it seem, however. Owing to the mountainous country west of the Hudson south of Albany, the railroad lines to the west nearly all begin either at New York or Albany, so that the course of traffic is southwest before going west or northwest on its way to the western market, and there are only a few New England towns for which the bridge provides a route shorter than by way of Albany or New York. Moreover, the hills east of the Hudson, though not very high, make bad gradients for the railroads, and those reaching the Hudson north of New York and south of Albany can only haul small trains between the Hudson and the Connecticut valley.

The really useful purpose of the Poughkeepsie bridge from an income standpoint is to furnish a short cut for the anthracite coal traffic, most of which originates at a point in Pennsylvania approximately opposite Poughkeepsie, although somewhat to the southward, while the Poughkeepsie bridge lines, especially when used in connection with the former New York and New England line running through Danbury and Waterbury, furnish a convenient way of getting coal to New England, although over a route which will always be restricted by bad grades. A current press report also mentions another use for the bridge which appears to the casual observer as being an amusing possibility rather than a very serious venture, and that is, that a through passenger service to the West can be run over the bridge in connection with the Erie Railroad. There is certainly no reason why such a service could not be run, and, if it has little to recommend it to New York patrons, a direct passenger route across the river might at least be made useful to residents of portions of Connecticut.

British Railroad Accidents in 1903.

If any one wishes to magnify the English accident record for the purpose of showing a worse condition there than in the United States, now is his time; for the record for 1903, just issued, shows an increase in the number of passengers killed in train accidents of no less than 317 per cent., as compared with the year preceding. Quite likely an equally startling comparison could be made on 23,000 miles of railroad in America, if one were to select the right years, but that should not disturb an enthusiast. The English increase in 1902 over 1901 was still more astonishing if one confine himself to percentages, for it was infinity; 0 killed in 1901, 6 in 1902. These suggestions, however, are made only for those who deem it profitable to look at statistics in that way. The rational way to look at the casualties is to compare them—as far as the facts are available—with the number of persons liable to accident; and such a comparison shows England still the safest country in the world for the railroad traveler, in spite of the Glasgow disaster, which is the principal factor in raising the number of passengers killed in collisions and derailments from 6 in 1902 to 25 in 1903.

The principal figures in the present report are (for the United Kingdom):

	1903.		1902.	
	Killed.	Inj'd.	Killed.	Inj'd.
Passengers in train accidents...	25	769	6	732
Employees in train accidents...	9	146	4	110
Passengers, other causes.....	123	1,912	123	1,814
Employees, other causes.....	446	3,659	443	3,713
Total from all causes, including "other persons".....	1,159	6,785	1,096	6,661

As already mentioned, the first item has been swelled by a single accident. Aside from this, the significant thing is the smallness of the changes in other important items. For example, the number of passengers killed from causes other than train accidents shows no change at all, and the number of employees killed in this class is almost exactly the same as in the preceding year. This class of passenger casualties is made up mostly of cases where the person himself is wholly or principally at fault, and the absence of fluctuations in this item tends to indicate that, from the statistical standpoint at least, these cases are largely unavoidable; that the total represents the minimum which remains after human ingenuity has exhausted all reasonable means of prevention. The smallness of the changes in the number of persons injured would seem to indicate a high degree of accuracy and uniformity in reporting accidents, for, as is well known, the large fluctuations in the number of persons injured which are found in the published reports of many governmental offices are undoubtedly due to irregular or careless methods of reporting.

The one notable accident in the British record for 1903 was a collision with buffer stops at Glasgow, July 27, in which the second car of a passenger train was crushed. This accident was reported in the *Railroad Gazette* of November 13. If an American critic wished to find ground for "pointing with pride" to American practice as contrasted with English, here is a case where he might find really appropriate material, for both in train-brake practice and in the construction of strong passenger-car frames, the English roads are behind those of America, or, at any rate, their practice is not so well settled. How many train movements are made into head-house stations in America in a year we do not know, but it is many hundred thousand. The freedom of our accident records of the last 20 years from serious cases under this head strongly indicates that the use of air-brakes alone for regulating speed, which is the universal practice, is safe and reliable; while the lack of unanimity of view on the subject in England confirms the impression produced by their accident record, that either entire or partial dependence on hand brakes is an unsatisfactory rule.

According to the *Frankfurter Zeitung*, a test has been made on the Berlin-Zossen military railroad of a superheated steam locomotive. With a train of six cars weighing 224 long tons, the engine attained a maximum speed of 79½ miles an hour and an average speed of 57 miles an hour. The maximum speed was reached 9½ minutes after starting. The entire run was made in 15 minutes. With three coaches, the maximum speed was 84 miles an hour and the run was made in 13 minutes at an average speed of 65.8 miles an hour. Six minutes after the start the speed was 74½ miles an hour. A maximum indicated horse-power of 1,800 was developed. The train resistance at 79½ miles an hour is about 25 lbs. per ton, so that the power actually developed is $\frac{25 \times 224 \times 79.5}{375} = 1,187$. In

other words, the power required to overcome head-end air resistance, machine friction, rolling friction, etc., of the locomotive is 1,800 — 1,187 = 613 h. p., or about 34 per cent. of the total power developed by the cylinders. This illustrates one reason why high-speed service is expensive. The engine used in these tests is the 4-4-0 type with Schmidt superheater, and weighs about 120,000 lbs. in working order. The cylinders are 20¾ in. in diameter, the drivers are 78 in. in diameter and the working pressure is 170 lbs. per sq. in. It is said that no dangerous vibrations were set up in the locomotive at the high speeds, but for easy riding it is important to maintain a total wheel base of 17 ft.

In the United States District Court of Connecticut, last Tuesday, Judge J. P. Platt refused the petition of C. K. Offield, of Chicago, for a transfer to that court of the condemnation proceedings in eminent domain brought by the New York, New Haven & Hartford to secure the two shares of New Haven & Derby Railroad stock which he holds. The Judge, in his decision, finds that a State Court in such a case must finish its condemnation proceedings before a Federal Court can even consider the question of its own jurisdiction—a finding which, if upheld, must go far to limit condemnation proceedings against minority shares to the state tribunals. In his testimony before the court Mr. Offield stated that since the suit was begun some two or three weeks ago he had been offered \$700 a share for his two shares—an exalted figure, and probably unprecedented as a "bid" price for guaranteed 4 per cent. railroad shares. The effect of the decision is probably to relegate the interesting case to the Connecticut courts and raise directly the constitutionality of the unique condemnation statute of that state, in which the present trial is probably not the last of the kind as the New Haven Company continues its active policy of merging subsidiary lines.

TRADE CATALOGUES.

Allis-Chalmers Company, Chicago, Ill., has issued a handsome catalogue, No. 54, in which the design and construction of the Sederholm boiler, built exclusively by that company, is fully explained. This type of boiler retains all of the advantages of the horizontal return fire tubular boiler, economy of operation, simplicity of construction and small cost of maintenance, and also combines the best features of the water-tube boiler. It consists essentially of a return tubular shell and four transverse heater drums underneath exposed to the heat of the

fire-box and hot gases passing back over the arch. These drums are connected into the bottom of the main shell with three water tubes, one in the middle of each heater drum and one rising from each end. The circulation is excellent.

Something Pneumatic is the title of a magazine which the Chicago Pneumatic Tool Company will publish monthly. The April number has 20 pages, with articles on "The Redfield Pneumatic Saw," "Chipping," "A New Design of Air-Compressor," "Carbureted Air," "The Pneumatic Hammer," "Rock Drills," "Pneumatic Appliances for the Foundry," and "The Modern Torpedo." The illustrations are mostly half-tone engravings of excellent quality. The magazine is 5 x 9, with a neat and appropriate cover design. It will be sent gratuitously to anyone interested in the field which it covers.

Rodger Ballast Car Company, Chicago, Ill., shows two views of the Hart convertible, Class F. H. ballast and flat car, together with a partial list of users and some strong testimonials, in a four-page folder recently sent out. This type of car was designed particularly to meet the requirements of builders of interurban electric railroads. It combines in one car all the valuable features of the Rodgers center-dump ballast car and is convertible in from 10 to 15 minutes into an ordinary flat car.

American Sheet Steel Company, New York, issues a price list of standard sizes galvanized and planished iron sheets. It contains besides the tables of sizes, prices, gages and brands, a number of illustrations showing process of making sheet steel from the burning of the charcoal used as fuel, on through all the various steps in the mills till it is stored for shipment in the warehouse. Illustrations of all of the 23 plants of the company are also shown.

Chas. P. Easton, Milford, N. H., issues a little folder devoted to his Perfection joint cement. This cement is specially adapted to steam hose, air-brake pipes and boiler mud plugs, and as it does not harden, connections may be taken apart at any time. A number of letters from customers are given.

The April List of Second-Hand Machines of J. A. Fay & Egan Co., Cincinnati, contains 71 items, including lathes, molders, sanders, saws, surfacers, tenoners, etc. There are also 15 miscellaneous items and 19 iron-working tools.

Shop Practice on the Norfolk & Western.

The draughting room at Roanoke, Va., has a well planned system of card indexing for the drawings and catalogues, so that all previous work is readily and quickly accessible to the designer. Tracings of details are made on sheets of uniform size, and these are card indexed on the regular library plan. This makes each drawing quickly available, as well as all drawings of similar parts. Each tracing is marked with the class of equipment to which it has

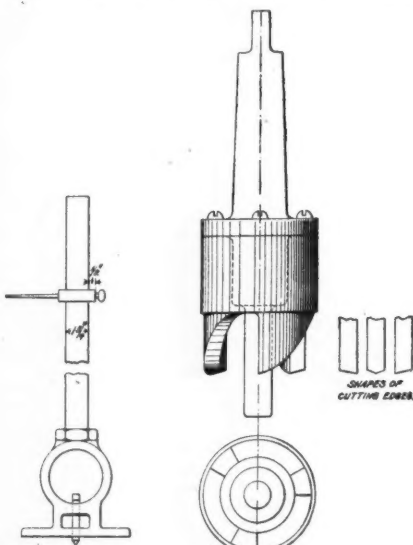


Fig. 1.

Fig. 2.

been applied. The tracings are numbered consecutively, as they are made, but they are not necessarily kept in consecutive order in the drawers, but similar parts are grouped.

In addition to the tracings, there are a large number of shop cards drawn on bond paper from which tracings can be made. Each of these cards contains from one to nine drawings of similar parts, such as pipe clamps, brake levers and the like, and relate for the most part to blacksmith work. The sheets measure 9 in. x 12 in., and have the heading:

Date. SHOP CARD. No.

The number is printed consecutively. As these sheets are too small to carry a reference to all the classes of equipment to which they may have been applied, a special index book is provided which is paged to correspond to the cards. The drawings on the cards are given

the first nine letters of the alphabet and the page of the index book is ruled as follows:

EQUIPMENT.		DRAWING.	
KIND.	CLASS.	GENERAL.	DETAIL.
BOX CAR.	F. G.	1003 A.	260.

There are nine of these rulings on each page, running from A to I inclusive, and under each letter are entered the kind and class of equipment upon which each one of the details was used, as well as the number of the general and detail drawings of the same.

The shop cards are further indexed by a special index book ruled as follows, from which any detail is made available at once:

SUBJECT.	No.
PIPE CLAMP.	120.

A card index is also kept of all prints sent out, together with the date. The record is strictly kept for all the shops on the road so as to have a check on them for the proper performance of work, by enabling the office to know whether information had been sent out.

It has been found economical for the road to build cars and locomotives as far as practicable. Whenever any work of this kind has been done a complete bill of material

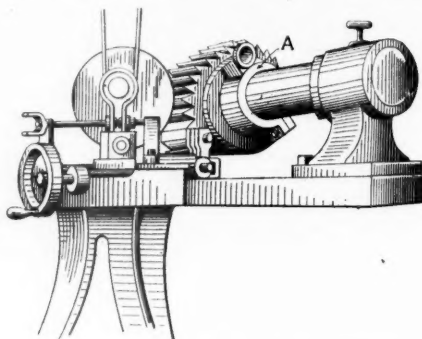


Fig. 3.—Adjustable Milling Cutter Grinder.

has been prepared, even for the smallest items, such as wood, screws and nails. These are drawn up on bond paper with printed headings, from which blue prints can be made. These sheets also measure 9 in. by 12 in. A complete bill is entered on these sheets, but items of different classes of work are entered separately. For ex-

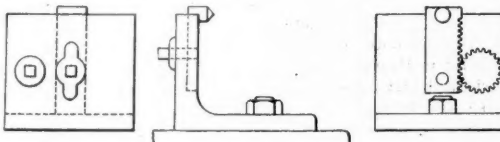


Fig. 4.—Adjustable Center for Emery Grinder.

ample, forgings, castings, lumber, bolts, purchased supplies, etc., are entered on separate sheets. A complete set is sent to the general storekeeper, but the several departments receive only sheets belonging to them. Thus the forging sheet is sent only to the blacksmith shop, the castings to the pattern shop, etc. With such data available it is possible to turn a complete set of specifications into the shop as soon as blue prints can be made.

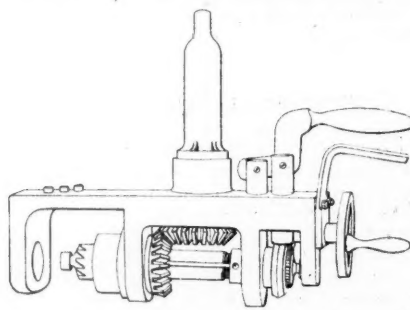


Fig. 5.—Countersink for Inside of Tubesheet Flanges.

Another card catalogue is kept of the patterns. This has the name of the parts and the pattern number as well as the class of equipment on which it is used. The patterns are numbered consecutively as they are made and a duplicate index is kept in the pattern shop.

Finally there is a card index of trade catalogues arranged by subject. The catalogues are kept in numbered filing cases to which the cards refer, and those relating to the same subject are kept together. In spite of these provisions there is complaint because manufacturers do not adhere to the standard sizes that have been adopted by the Master Car Builders' and Master Mechanics' associations.

With this system of indexing and the quick and ready reference to past work which is at hand, the labor of the drawing room is reduced to a minimum and in the working out of details, it is possible to ascertain at once if old work can be used in the new. This method reduces the number of standards.

A number of ingenious tools have been originated at the Roanoke shops. Some of these were described in the *Railroad Gazette*, Oct. 9, 1903. A gage for the adjustment of smokestacks so that they stand central over the exhaust nozzles is shown by Fig. 1. It consists of a cast-iron base having slotted holes for holding bolts. Fitted into the top of the base is a rod 1 1/4 in. in diameter, which extends to the top of the stack, and central with and beneath it is a sharp-pointed set screw. The adjustable caliper arm moves freely along the rod. To use the device a center is first accurately located at the opening of the exhaust passage—the exhaust pipe being removed. The gage is then bolted on the seat of the exhaust pipe with its set screw in contact with the center. The stack is then centered by swinging the caliper arm around the rod.

Another handy device (Fig. 2) is an adjustable center for an emery grinder. It consists of an angle casting bolted to the bedplate with the center on a slide moving in a groove in the angle. A clamping screw is threaded into the back of the slide by which the latter can be held in any position. The adjustment is made by a small gear meshing in a rack cut in the side of the slide.

Another emery grinding device for grinding milling cutters is shown by Fig. 3. It is especially adapted for use on heavy machines. A peculiar feature of the device is its stop for the straight face and the provision for adjusting the wheel to properly grind the rounded end of the cutter. The stand can be moved in and out by a

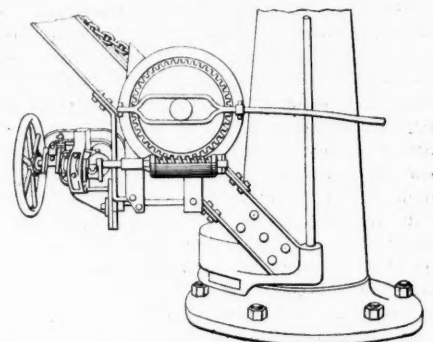


Fig. 6.—Compressed Air Engine on Pillar Crane.

screw. The wheel is carried by a supplementary pivoted stand which can be moved away from and towards the center. The stop in front of the wheel serves as a guide for the movement of the cutter while it is being ground. The cutter is carried by a stationary mandrel and is moved along the mandrel with the lip of the cutter being ground resting against the top of the stop. When the curved end is being ground the wheel is swung to and fro about its center, and the cutter is adjusted by having its teeth successively brought to bear against a stop on a collar (A) fixed to the mandrel. The cutter is held firmly against a pin in the collar which serves for longitudinal adjustment.

In cutting holes in tube sheets, a very efficient cutter is used (Fig. 2). Ordinarily, after the preliminary holes have been drilled on the centers a cutter with straight and horizontal cutting edges is used. With such a cutter it is exceedingly difficult to do the same amount of work on each edge. In the cutter shown, three cutting edges are used, each having a differ-

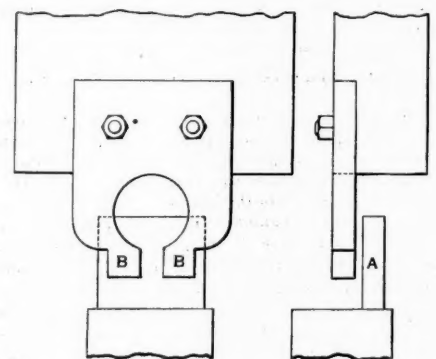


Fig. 7.—Cutters for Shearing Ends of Staybolts.

ent shape. The engraving shows the general shape of the tool, which is intended to be held in the socket of one of the spindles of a multiple drill. The edges of the cutters are shown in detail. One has its lowest point at the center, another at the outer edge and the third at the inner edge. These cutters are 5/16 in. thick, and are cut out of a cylindrical shell, all being in one piece. This variation of shape gives each cutting edge a distinct part of the work to do, and entirely obviates any tendency to crawl or work out of center.

Another similar tool (Fig. 5) is intended to countersink holes in the inside of the flanges of tube sheets. It is used on a drill press and consists of a U-shaped frame carrying a shaft with a milling cutter which is driven by bevel gears. The feed is obtained by means of the usual screw and sliding mandrel, with a keyway fitting a feather in the gear. A friction wheel on the end of the screw with a suitable brake manipulated by hand regulates it when the apparatus is at

work, while the cutter can be rapidly run in and out by a gear and handle.

Air hoists are extensively used throughout the shops, and a very cheap method of making the cylinders has been put into use. Wrought iron pipe is employed, and instead of being bored, the length is partly filled with small pieces of scrap iron, the ends closed, and the whole converted into a rattler which is run for from 12 to 14 hours, at the end of which time the interior becomes polished enough to be made air-tight by the packing and not wear the latter out as it moves up and down with the piston.

Air is also used to drive reciprocating engines (Fig. 6) on some of the cranes. These engines are coupled in pairs at right angles and drive a worm meshing with a gear keyed to the chain drum shaft. Reversal is accomplished by a three-way cock, which changes the inlet

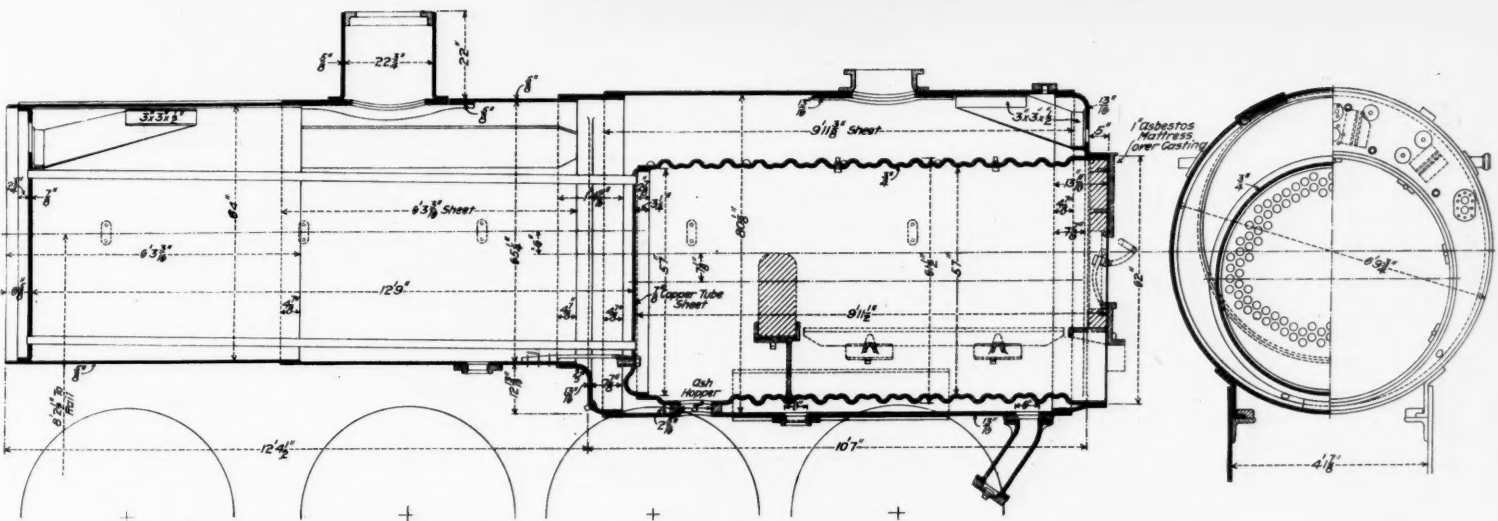
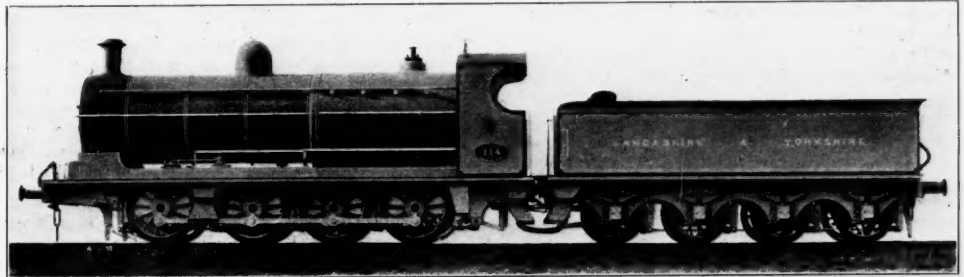
represented, has a much more limited field of legislation than the several countries of which the Empire is composed.

Eight-Coupled Freight Locomotive—Lancashire & Yorkshire.

The Lancashire & Yorkshire, England, has had in use for several years the locomotive shown herewith. The engine has eight driving wheels, all coupled. The cylinders are 20 in. x 26 in. placed inside the frames and drive the second axle. The most interesting feature of the design is the boiler, which has a circular corrugated fire-box. The arrangement of the grate and arch is shown in one of the engravings. The fire-door opens inwardly in accordance with usual English practice, so that the cold air which enters the fire-box when firing, is directed down-

60 lb. weight per yard—giving a mass weighing, say about 1,400 lbs. and of a section of about 12 in. square. To-day the ingots are about 22 in. square, and weigh more than 4,000 lbs. Of course, the interior of the larger ingots must remain hot and liquid longer than that of the smaller ones, and from this condition arises the steel rail makers' *bête noir*—segregation of the metaloids and piping of the steel. The smallest-sectioned ingot will pipe, but with the increase of its size, so will be that of the interior cavity. This tendency existing and being well known, it would seem that rather than being ignored, especial care should be exercised to avoid the evils arising from it.

In the earlier days of steel rail making, after the ingot had been rolled down to a bloom of six or seven inches square, all cracks were carefully chipped out of it. Such defects could not be welded up by subsequent working.



Eight-Coupled Freight Locomotive—Lancashire & Yorkshire.

pipe of one motion to the exhaust of the other, and vice-versa.

A neat job of milling has just been done which consisted of making a worm that could not be cut in a milling machine in the usual way. An end mill was therefore made that fitted the old worm which was to be replaced, and by giving it the proper feed corresponding to the pitch of the worm the work was quickly and accurately done, the cutter standing radially to the piece during the operation.

The cost of squaring the ends of staybolts has been greatly lessened by shearing instead of hammering. The usual method of heating the end of the bolt and forging out the square has been entirely done away with. Instead, a shearing die like that shown in the illustration (Fig. 7) is put into a punch. The end of the bar is slipped in against the stop A and at the down stroke the two lips of the shear BB cut-slices off from two sides of the bar. As the shear rises the bar is given a quarter turn, and the next down stroke, by removing two similar slices, completes the squaring of the bar. The surfaces thus cut are quite rough, but as they are to be used only once for turning in the bolt they answer the purpose and are less expensive to form than where the work is done under the hammer.

Having been asked in the Prussian House of Lords whether the State Railroad employees had manifested any revolutionary disposition, the Minister of Public Works answered that no movements of the kind existed among the 400,000 men in his department. Paid agitators of the Social Democracy endeavor to seduce them from their duty, and 21 workmen had been proved to be active members of the Social Democratic party. Orders were given immediately to discharge them. "For I would like to say, and say so that railroad men throughout the country may hear: I suffer no active Social Democrat in the State Railroad service, either as officer or laborer." The contracts with men when they enter the service require that the employee refrain from all revolutionary movements, and if he violates that article of his contract his discharge is his own fault. As the Social Democratic party casts more votes than any other (though not nearly a majority; for there are many parties), this position is regarded as a declaration of war by some millions of Germans. But their power is by no means in proportion to their numbers, for in Prussia the suffrage is limited, and the Empire, in the legislature of which the Socialists are largely

wards on the bed of coals, thus preventing cold air from rushing in against the tube and fire-box sheets.

The total wheel base is 16 ft. 4 in. The distance between the second and third, and the third and fourth axles is 5 ft. 2 1/4 in. The distance between the first and second axles is 5 ft. 11 1/2 in. The wheels are 54 in. in diameter. The weight on each pair of wheels is given in the following table:

First	31,985 lbs.
Second	34,400 lbs.
Third	33,800 lbs.
Fourth	29,370 lbs.

Total

The diameter of the boiler barrel is 65 1/4 in. and the diameter of the fire-box over the corrugations is 61 1/2 in. The boiler contains 280 2-in. tubes, 12 ft. 9 in. long. The total heating surface is 2,007 sq. ft., of which about 6 per cent. is in the fire-box. The grate area is 26 sq. ft. The tender, loaded, weighs 52,740 lbs. and holds 3,600 Imperial gallons of water and 5 long tons of coal.

The only alteration which has been found necessary is in the grate, which has been shortened 12 in. The illustrations and general details for this description were furnished by Mr. H. A. Hoy, Chief Mechanical Engineer of the L. & Y.

Rail Steel.*

BY ROBERT W. HUNT.

The mechanical treatment of the metal forming a steel rail, during its manufacture, is comparatively of much greater importance than its chemical composition. Years of observation have confirmed and emphasized that fact. The comparison of the wear of the earlier steel rails with that of later ones, and to the great disadvantage of the latter, is still being constantly made by railroad officers. And while some of us, with experience covering the whole history of the manufacture of steel rails, are aware of the great differences in the conditions governing their production at various periods, I do not think the engineering world generally appreciates the direct and imperative influence those variations have had, and are having, upon the wearing quality of the rails.

In the earlier days, the steel was poured into ingots which would make but two 30-ft. rails of not exceeding

but if cut out to the deepest point, particularly if the forming of sharp corners was avoided, the steel would, when further rolled, draw from the bottom up; and so if the cavity was not too deep, a sound bar of rail would result. This chipping was performed under a steam hammer. Later, if while the bar was passing between the rolls of the rail-mill defects were discovered, the rolling operation was suspended until they could be chipped out. Then, again, great care was taken that the steel bloom should not be overheated. There were from six to eight blooms, each of a size to produce one rail, charged at one time into a heating furnace; and skilled workmen attended to their heating, turning them over on the bottom of the furnace so that all sides should become of an equal temperature. If from any cause this man made a mistake, and sent his steel to the rolls in an unsatisfactorily heated condition, the head rail-roller, or some other mill official, rejected it, and it was returned to him for further treatment. This meant that more or less care was exercised on each and every rail; but the daily production was, when viewed from to-day's standpoint, quite small. The first departure was to cease chipping the blooms at the rail-rolls—the next, to make it one continuous process from the first blooming of the ingot to the finished rolling of the rails. This procedure stopped the intermediate chipping of the blooms under the steam hammer, and carried with it the rolling of more than one length rail, that is, the rolling of a mass of steel large enough to produce more than one rail length, and the subsequent sawing of this into two or more rails.

This new method of rolling had been made possible by the introduction of automatic machinery; and the daily production of a given rail-mill increased very rapidly. But I regret to say that the care which it was possible to bestow on the making of each individual rail decreased in an even greater ratio—an effect which was inevitable.

In the old days, a Bessemer converting-house was equipped with two converters, each of about five tons capacity, which were gradually enlarged to 7, 10, 15, and even 20 tons, and additional converters added. Of course, the size of the house, blowing-engines, cranes, etc., were all proportionately increased and the development of the plant has proceeded until, instead of about 12,000 tons of ingots per month coming out of one converting-house, more than 70,000 tons per month are now produced. There is more and larger machinery, and it has been said such large product is the best evidence that everything must have been running smoothly. That is true

*Read at the Atlantic City meeting of the American Institute of Mining Engineers, February, 1904.

so far as mere production goes; but the speed and momentum are against the exercise of the proper kind of care necessary to produce sound ingots of the highest quality of steel. This is old-fashioned doctrine, but it is true.

Of course, if the same radical course should be pursued with rail-Ingots as is done with those intended for ordnance, armor or heavy shafting-purposes, by which the upper portion of each ingot, amounting to quite one-fourth of its entire weight, is cut off and treated as scrap, we know the greatest danger from segregation and piping would be eliminated. But this procedure will reduce the output of finished rails, and in that and other ways add much to the cost of making them. But if it is necessary in order to obtain safe rails, should not the situation be boldly faced? If railroads must pay more money, and can by so doing secure rails which will not only be safe against breakage under traffic, but also give better wear, will it not be economy for them to make the greater investment? That would be one way to meet the difficulty, but there are others also.

Alexander L. Holley had more to do with the introduction in America of the Bessemer process for making steel than any other man; and, later, probably did more than any one else to make possible its greatly increased and cheapened output. Some years after that process was firmly established in this country, the Siemens-Martin or open-hearth process was developed, and Mr. Holley was convinced that it also had a great future in America. So outspoken was he in support of this, that on one occasion an intimate associate of his said, "It sounds strange for you, of all men, to advocate so strongly the merits of the open-hearth process." He replied: "You mark my words, the open-hearth process will live to attend the funeral of the Bessemer process in America."

In my judgment, the one question of ore-supply will, in time, compel the increased use in this country of the basic open-hearth process. We cannot forever continue the rejection of ores which are in every other quality suitable for steel making, because their phosphorus-content is outside of the Bessemer limit. And if at the same time, by the use of the other process, we produce a better metal, at cost not much if any greater, the outcome is inevitable. Phosphorus is the controlling element in rail-steel. If that can be practically disregarded, no one will deny the ability to make a better article, no matter for what purpose it may be intended. So far as rails are concerned, the theory relating to the difference in the wear of the steel made by the two processes is being subjected to the crucial test of practice. But no matter what steel is used, care must be exercised in making it; in pouring the ingots; in their handling and heating; and in the rolling and straightening of the rails.

Under all the existing conditions the present is not the time for the adoption of any specification as standard. For the last few years, commercial conditions have been such that there has been practically but one side to the market. Such is not now exactly the case. The rails of heavy sections have not been giving the anticipated service. Both Bessemer and Basic Open-Hearth rails are being made in America, and placed in service, side by side. Foreign rails of both basic and acid Bessemer steel have been imported. Several of the large railroad systems have contracted for rails under somewhat new specifications. Let us, before saying which or any are the best, await results of actual experience. No matter what chemical formula, or which process of making steel, is selected, unless care in manufacture is exercised, all will have been in vain.

The railroad which the Russians have built on the ice across Lake Baikal does not follow the ferry route, but from the terminus on the west shore extends to a point 46 miles south of the ferry landing at Myssovaya, on the east side. Over the intervening distance the track is already laid on the Circum-Baikal line, the land not being particularly difficult there, as it is on the west side, where the mountains overhang the lake and there will be 32 tunnels of an aggregate length of 3½ miles in the first 53 miles, and 210 bridges, culverts and similar structures. The materials for the railroad on the ice have been taken from a light railroad near St. Petersburg. The lake is a much more formidable body to cross than the Mississippi, over which tracks were laid near Prairie du Chien every winter in the old days, not only because of its greater breadth, but because, being some 400 miles long from northeast to southwest, the wind piles up slabs of ice some feet thick at the southern end before the whole surface becomes solid from bank to bank, and leaves a very rough place for a track.

TECHNICAL.

Manufacturing and Business.

The Southern Railway is receiving bids at Washington, D. C., for one 10-ton and one 5-ton electric traveling cranes.

The Weller Rolling Mill and Forge Co., Anniston, Ala., has added a railroad spike mill to its works.

The Crocker-Wheeler Co., maker of electric machinery, Ampere, N. J., will increase its capital stock from \$1,000,000 to \$2,000,000.

The Street Railway Supply Co., of Augusta, has been incorporated in Maine with a capital of \$250,000 by E. F. Whittum and L. H. Tracy.

The United States Rail Joint Co., of Atlanta, has

been incorporated in Georgia with a capital of \$5,000, by R. H. Brown, M. L. Rose, and others.

The Nassau Electric Light & Power Company is asking bids for a 3,000-k.w. generating set for its new station at Hempstead Harbor, Long Island.

F. J. Manley, Civil Engineer, of Harriman, Tenn., will soon be in the market for rock drills, hoisting engines, rails, wire rope, sewer pipe and track material.

John F. Allen, 370 Gerard avenue, New York, has sold an Allen Riveting Machine to the Southern Pacific. The machine has 55-in. reach, 12-in. cylinder and 20-in. gap.

The L. J. Bordo Company, Camden, has been incorporated in New Jersey with a capital of \$100,000, to make iron and steel, by L. J. Bordo, John F. Joline and others.

Bids are wanted May 2 by the Board of Public Works of Fulton, N. Y., for one pumping engine with a capacity of 3,000,000 gallons in 24 hours. Thomas Hunter is President.

The Ford Manufacturing Co., of St. Louis, has been incorporated in Missouri, by G. R. Ford, G. A. McGintie, and others, with a capital of \$50,000, to make machinery.

Bids are wanted April 28 by the United States Engineers' Office, Pittsburg, for building a steel lock-gate and anchorage in the harbor at Pittsburg. W. L. Sibert is Captain of Engineers.

The Kennicott Water Softener Company, Chicago, will, on and after April 15, occupy new offices at 525-27-29 Railway Exchange Building, corner Jackson and Michigan boulevards, Chicago.

The Pennsylvania is asking bids for five gantry cranes, one to have a capacity of 50 tons and four each with a capacity of 10 tons, to be used on its new pier at Greenville, N. J. L. H. Barker, Engineer, Jersey City, N. J.

The Hetfield Car Cover Co. has been incorporated in New Jersey, with a capital of \$100,000, to make railroad cars and car covers. The incorporators are J. D. Loijeaux, J. T. TenEyke and W. R. Codington, all of Plainfield, N. J.

Bids were opened by Bridge Commissioner Best, of New York City, April 8, for building railroad tracks on the Williamsburg Bridge. That of Naughton & Co. was \$310,665, and the next lowest bid, that of R. H. Hood & Co., was \$314,230.

Joseph E. Schwab's resignation as President of the American Steel Foundries has been accepted, to take effect April 16, and Charles Miller has been appointed Acting President. Mr. Schwab will remain a member of the Executive Committee.

The American Railways Co., of Persia, has been incorporated in New York with a capital of \$100,000 for the purpose of securing franchises in Persia. The incorporators are Samuel S. Watson, Walter B. Raymond and William L. Ferris, all of New York City.

The Mutual Construction and Improvement Co. has been incorporated in New Jersey with a capital of \$1,500,000, to do a general construction business, including the building of railroads, by Pressley E. Blisard, William Plimley and William E. Sage, all of Jersey City.

Geo. W. Cox & Co., Pittsburg, Pa., have been appointed representatives for Pittsburg and vicinity of the Northern Metallic Packing Co., St. Paul, Minn., makers of Curran chime whistles and Northern metallic packing. This company has recently been allowed a patent on its metallic packing.

Efforts are being made by Roy G. Foster, President of the Georgia Car & Manufacturing Co., of Savannah, Ga., backed by the Chamber of Commerce, to pay off the indebtedness of the company and reorganize it. The company has been allowed until May 5 to answer the petition of its creditors.

Lewis D. Rights has resigned as Engineer of the structural drawing room of the American Bridge Company, Ambridge, Pa., to accept a position as Contracting Engineer with Lewis F. Shoemaker & Co., Harrison Building, Philadelphia, owners of the Schuylkill Bridge Works, Pottstown, Pa. Mr. Rights formerly had charge of the Berlin drawing room of the American Bridge Company, and later was transferred to be engineer of the eastern division drawing room, Pencoyd, Pa., where he had the supervision of the details of construction for the Ambridge plant.

The Crocker-Wheeler Company, Ampere, N. J., manufacturers and electrical engineers, has increased its capital stock from \$1,000,000 to \$2,000,000. The company was organized with a small capital in 1892 by Dr. S. S. Wheeler and Prof. F. B. Crocker. Since that time the capitalization has been increased gradually as the business expanded and in 1899 it reached \$1,000,000. The greatly enlarged plant and working capital required to carry out the orders now in hand and the bright prospects for the future has caused the stockholders to double the company's capital. It now has fifteen branch offices in the United States.

John L. Weeks, Treasurer and General Manager of the American Steam Gauge & Valve Manufacturing Company, of Boston, Mass., died April 2, after an operation for appendicitis. Mr. Weeks was identified with the company for some 13 years, starting as an agent in Chicago, and later acting as manager of the branch office of the company in that city. Some five years ago Mr. Weeks was called to Boston and made treasurer and general manager of the company. Under his direction the business of the company increased materially, and during

his administration the capacity of the factory was increased and it finally moved from Jamaica Plain to Boston.

Improvements at the works of the Phoenix Cement Company, of Nazareth, Pa., are to be made by Dodge & Day, Engineers, of Nicetown, Philadelphia. Many of the buildings will be enlarged, and electric transmission used throughout. A 200 kilo-watt generator will be put in; a tandem compound engine for generator, one 50 and one 75-h.p. motor, and a number of smaller motors; charging cars, turntable, coal and ashes conveyor, underfeed stokers, steam locomotive for hauling cars to and from the quarries; electric hoist, electric air compressor, blower and exhaustor, air-cooling conveyor, belt conveyors, elevators, automatic weighing machine, extension of track system, etc.

Iron and Steel.

The open-hearth furnaces of the Carnegie Company at Sharon, Pa., are running full time for the first time in eight months.

The Pencoyd Iron Works, in the neighborhood of Philadelphia, which has been shut down for several months, it is reported, will be opened next week by reason of the increased demand for structural material.

The Empire Steel & Iron Company's report for the year ending Dec. 31 shows a balance of \$165,443, against \$128,639 for the previous year, with net earnings, less depreciation, of \$308,651 against \$203,087.

Interlocking.

Interlocking signals are to be put in at the crossing of the Cincinnati, Hamilton & Dayton and the Chicago, Peoria & St. Louis at Springfield, Ill.

The State Railroad Commission of Texas has approved plans for interlocking signals at the crossing of the Gulf-Colorado & Santa Fe and the St. Louis Southwestern at McGregor.

The Taylor Signal Company, of Buffalo, N. Y., has taken the contract to install electric interlocking on the Vandalia line at Willows, Ill. The machine will have 92 levers.

Work will soon begin on a Taylor interlocking plant of 46 levers in Terre Haute, Ind., at the crossing of the Cleveland, Cincinnati, Chicago & St. Louis and the Chicago & Eastern Illinois.

M. C. B. Drop Test Machine.

The Master Car Builders' drop testing machine, which for some time has been in process of erection, is now completed and ready for use. It has been installed at the laboratory of Purdue University, Lafayette, Indiana, where it will be operated under conditions similar to those prevailing in connection with the Master Car Builders' brake shoe testing machine and the Master Car Builders' air brake testing rack. The conditions are such that the machine may be used not only by Committees of the Master Car Builders' Association, but also by individual railway companies and manufacturers as well. The drop weighs 1,650 lbs., and is so designed that supplemental pieces may be added to increase its weight to 2,000 lbs. The maximum height through which the drop may fall is 50 ft. The machine may be used in testing materials of any kind, provided that the form of the part is such as will permit it to be located under the drop. It is especially designed to test couplers, draft gears, axles, rails and bolsters. Parties interested in making use of the machine should communicate with Prof. W. F. M. Goss, Dean of the Schools of Engineering, Purdue University, Lafayette, Indiana.

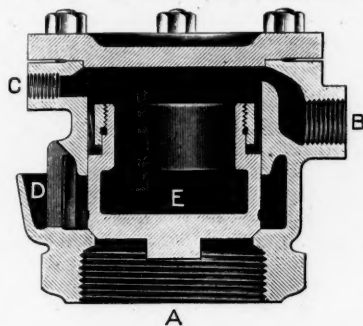
Exports and Imports for February.

The advance sheets of the monthly Summary of Commerce and Finance show that the value of total exports during the eight months of the fiscal year ending March 1, 1904, was \$1,048,025,063, as compared with \$982,068,063, the total value of all articles exported during a corresponding period in 1903. The value of exports for February, however, decreased in value, from \$125,586,024 in 1903 to \$118,878,719 in 1904. In this connection, it is interesting to note that, although our exports to Europe, South Africa and Canada show heavy increases for the past eight months, in the case of China and Japan there is a considerable decrease, due presumably to the existing hostilities there and to the unsettled state of trade. It is also the indirect result of the recent high prices in the cotton market, which reduced the amount of cotton exports to Japan from 70 million lbs. during the eight months ending February, 1903, to 20 million lbs. during the past eight months. One of the minor countries where there is a noticeable increase in exports is Cuba. The value of exports to Cuba during February, 1904, were \$2,151,328, as against \$1,535,978 in February of last year. This is, without doubt, due to the effect of the reciprocity bill recently passed by the United States Senate. The exports to Cuba for the whole year will, presumably, show a much larger increase, as the law has hardly been in effect long enough to disclose the extent of its influence.

The value of imports for the last eight months has decreased considerably, being only \$654,159,937, against \$680,771,760 in the same period of 1903. The value of imports for the month of February, however, shows an increase, being \$88,820,953, as compared with \$82,622,246 in 1903. Imports from Cuba, as well as exports, have been very heavy, and show a marked increase. During February, 1904, the value of goods imported from Cuba was \$7,711,704, as against \$4,013,453 in February, 1903.

New Cylinder Relief and Vacuum Valve.

The new cylinder relief and vacuum valve shown herewith was designed especially for piston valve and compound locomotives. It relieves excess pressure due to water, etc., in the cylinder and also relieves, to a great extent, the



vacuum created by the piston when the engine is drifting. The valve has no spring, but is held to its seat by the initial pressure and is also held away from its seat by the vacuum created in the live steam passage when the engine is drifting. The inlet "A" is screwed to the cylinder and gives a full 3-in. opening. A $\frac{3}{4}$ -in. pipe which connects to the live steam chamber is screwed to the inlet "B." When undue compression occurs the water escapes through the orifice "D," which also serves to admit air when the engine is drifting. The valve is made by the Star Brass Manufacturing Company, Boston, Mass.

Ventilation of the Fiberloid Co.'s New Plant.

The Fiberloid Company has recently completed a large and modern works at Indian Orchard, Mass., for the production of Fiberloid, a product very similar to celluloid, but made from a different base by a somewhat different process. The plant is composed of 20 brick buildings including an office building, and was designed by F. S. Hinds, of Boston, a prominent mill architect. All of the buildings are heated and ventilated by the Sturtevant fan system. The air is filtered before it passes through the heater and is forced into the rooms by a fan. The temperature of the incoming air is automatically controlled and the rooms can be maintained at any desired constant temperature. All of the mill buildings are heated and ventilated from three main heating stations and fans. The air is drawn from the outside, filtered, heated and conveyed through underground brick ducts to the various buildings. Vertical flues are built in the brick walls and the air is forced into the rooms at a low velocity through openings provided with registers and dampers. The fan system is also used in several of the buildings for special drying and cooling purposes. In the sheet dryhouse there is a special Sturtevant drying apparatus for drying the sheets of Fiberloid and in the sheet room is a special apparatus for maintaining an even, cool temperature necessary in the process of manufacture. The rolling mill is also ventilated with a special apparatus.

Draft Gear.

The Master Car Builders' Association Committee on Draft Gear asks for information and recommendations as follows:

- (1) What spacing between the inner faces of center sills would you recommend for cars of (a) wooden construction; (b) steel construction?
- (2) Would this distance be suitable for low cars with draft gear between the sills for (c) twin-spring type; (d) tandem-spring type; (e) friction type?
- (3) Would this distance be suitable for high cars with draft gear below the sills for (f) twin-spring type; (g) tandem-spring type; (h) friction type?
- (4) What total movement of coupler do you recommend for (i) twin-spring type; (j) tandem-spring type; (k) friction type?
- (5) What clearance for draft gear inside of yoke back of coupler would you recommend as standard? (l) Length for twin spring; (m) length for tandem spring; (n) length for friction type; (o) height for twin spring; (p) height for tandem spring; (q) height for friction type.
- (6) Send blueprint of yoke recommended for (r) twin spring; (s) tandem spring; (t) friction type.
- (7) What form of stops or side castings would you recommend? Send blueprint or sketch.

The committee is not yet in possession of sufficient information to enable it to make a general recommendation; but, on account of the rapid multiplication of designs it would like to see certain limiting dimensions adopted, within which the designers should work. The committee would like to have all members give their experience with the various modern draft gears on modern cars, and especially the results of any experiments or exact data covering cost of maintenance of draft gear and car bodies, where comparison has been made between spring gears and friction gears.

Replies should be sent to J. W. Taylor, 658 Rookery Building, Chicago, as soon as possible.

THE SCRAP HEAP.

Notes.

The New York, New Haven & Hartford intends to again go to the Connecticut legislature next January to secure a modification of the four-day car-detention law of the State.

The Railroad Commissioners of Louisiana are requiring at every passenger station a bulletin giving the following announcement: "All freight and passenger tariffs of this company, and the rules and regulations of the Railroad Commission of Louisiana, are on file in this office, and the agent is required, upon application of any person, to exhibit them for inspection. Drinking water will be furnished by the agent on application. Bulletins will be posted thirty minutes before train time." A similar notice is to be required also at freight offices.

A press despatch from Ogden, Utah, reports the consolidation of the operating departments of parts of three Harriman lines into one district, as follows: the Union Pacific west of Green River, Wyo.; the Southern Pacific east of Wadsworth, Nev., and the divisions of the Oregon Short Line centering in Ogden. The despatch contains, in addition, the somewhat doubtful statement that every employee on the Southern Pacific and the Union Pacific, in the district named, was dismissed and immediately re-engaged; this change affording opportunity for the reduction of salaries and the abolition of rights of seniority. And it is said that the opportunity was improved, many salaries being reduced 10 per cent., and some much more than that.

On the Cleveland, Cincinnati, Chicago & St. Louis (Cleveland division), an order has been issued for the running of trains between Grafton and Linndale, 19 miles, double track, wholly by block signals. The superiority rule of the time-table is abolished and the classification of trains, when it is necessary to classify them, will be managed by the train dispatcher. According to the circular of instructions, issued by Superintendent A. S. Ingalls, a "sub-clear" signal is to be used to permit a third-class or fourth-class train to enter a clear block section on the understanding that it is to clear the main track at the next siding. In the daytime this signal will be given by inclining the semaphore arm upward; and at night by a yellow light, which latter appears to be used also in distant signals.

The accompanying fac simile of the first time-table of the Lehigh Valley, dated June 15, 1855, is reproduced

Lehigh Valley Rail Road

The Lehigh Valley Rail Road being now completed from South Easton to Allentown, passenger trains will commence running on Monday June 16-1855 between the above named and intermediate places on Monday June 16-1855

Trains will leave as follows

<i>Allentown</i>	<i>at 4.30 A.M. and 1.30 P.M.</i>
<i>Bethlehem</i>	<i>at 4.50 A.M. and 1.50 P.M.</i>
<i>South Easton</i>	<i>at 12.30 P.M. and 7.00 P.M.</i>

S. Fare from Allentown to Bethlehem. 10¢
" " Bethlehem to South Easton 5¢
" " Allentown to South Easton 15¢

The above arrangement allows passengers 50 minutes to get from South Easton to the Depot of the New Jersey Central and Delaware & Hudson Rail Roads.

Stops will be in residences at Allentown on the arrival of the 12.30 P.M. train from South Easton, to convey passengers to Allentown, Schuylk. and Reading.

1855

from the *Black Diamond Express Monthly*. The schedule was written by the chief engineer, whose duties seem to have been diverse.

The Interstate Commerce Commission, in an opinion by Commissioner Prouty, has announced its decision in the case of Charles M. Cist against the Michigan Central. It is held that a passenger fare charged by defendant over its branch line from a point in Canada to a point in the United States amounting to about 3 cents a mile for a distance of 35.3 miles, and including a 6 cent bridge charge by an independent company, is not unreasonable upon the facts of this case. When a railroad company makes a reduction from regular passenger fares which are not found unreasonable it may lawfully require that a person desiring to avail himself of such reduction shall purchase a ticket, and that all persons not holding such special reduced rate ticket shall pay the reasonable ordinary fare. While the regulating statute may be applied to the reasonableness of a rate from a point in Canada to a point in the United States, it is clear that no law of the United States can apply to a discrimination between places in a foreign country.

The Interstate Commerce Commission has reported to the United States Senate on the Senate resolution of March 11, requiring the Commission to report the principal changes in rates and an estimate of the effect of such changes upon revenues, etc. The report shows numerous advances in rates caused by change of classification and also advances in some specified commodities. A table based upon the average rate per ton received by the railroads in 1899 applied to the actual tonnage for the succeeding years shows an increase in gross revenue over 1899 of \$456,736 for 1900; \$81,599,443 for 1901; \$64,-

528,216 for 1902, and \$155,475,502 for 1903. These are for the fiscal years ending June 30. A similar calculation is used in estimating increased revenues derived from the transportation of a number of specified commodities. The Commission says that no accurate or even approximate estimate of the actual effect of specific changes in rates upon the revenues of the carriers can be made, but that the method of computation directed by the resolution is not without value as indicating enormous additions in recent years to the cost of railroad transportation to the people of the United States. The changes in cost of operation and maintenance as required by the resolution are also given in the report.

Offices for the Panama Canal Commission.

The Washington office of the Isthmian Canal Commission was last week moved to the Evening Star Building, where the Commission will occupy the entire third floor and a part of the fifth.

A New Battleship.

The first-class battleship "Virginia" was launched on April 5 from the yards of the Newport News Shipbuilding and Dry Dock Co., at Newport News, Va. The "Virginia" is of 14,600 tons displacement and has twin screws and 18,000 i. h. p., and is a sister ship of the "Rhode Island," now building at the yards of the Fore River Ship and Engine Co., at Weymouth, Mass.

River and Harbor Bill.

The only river and harbor bill to be introduced at this session of Congress has been agreed upon by the Committee on Rivers and Harbors of the House of Representatives, and was introduced last week. The bill appropriates \$3,000,000, to be expended under the direction of the Secretary of War in maintaining the proper width and depth of channels throughout the United States, no one channel to be allotted more than \$50,000.

"The General Railway Signal Company."

Negotiations are in progress for the consolidation of the Taylor Signal Company, of Buffalo, and the Pneumatic Signal Company, of Rochester. It is said that they have been brought nearly, or quite, to a conclusion, and that the name of the consolidated company will be that given in the title to this paragraph. It is understood that the mechanical or non-electric work will be done at the Rochester shops, and the electric at Buffalo. It is probably the intention to add automatic block signaling work to the productions of the combined establishments. The reports say that Mr. W. W. Salmon, President of the Taylor Company, is to be the executive head of the new concern.

Bourbon Stock Yards Case.

The Interstate Commerce Commission, in an opinion by Commissioner Prouty, has announced its decision in the case of the Railroad Commission of Kentucky against the Louisville & Nashville Railroad.

The railroad company is a party to a contract with the Bourbon Stock Yards Company for the delivery of live stock in the city of Louisville only to the yards of that company, and when live stock coming over its lines is consigned to the Central Stock Yards, a competitor of the Bourbon Yards, defendant refuses to transfer such live stock to the Southern Railway for delivery to the Central Yards. The defendant ought, in fair consideration of all interests, to deliver to the Southern Railway live stock so consigned to the Central Yards, but the question raised for determination is whether the Commission can by its order require this to be done. After citing and applying decisions of the Federal courts the Commission holds:

That defendant in making and carrying out its exclusive contract with the Bourbon Stock Yards Company is not acting in violation of the act to regulate commerce.

That the act to regulate commerce does not confer upon the Commission authority to make an order affirmatively requiring a railroad to deliver carloads of interstate freight to a connecting carrier.

That upon the facts of this case it is not unlawful discrimination between commodities for the defendant to deliver carloads of "dead" freight to the Southern Railway for consignees in Louisville and to refuse such delivery of live stock; that the Commission has no regulating authority beyond that conferred by the terms of the act to regulate commerce and its jurisdiction does not extend to enforcing provisions in the constitution of the state of Kentucky.

Notes on the Prussian State Railroads.

In reply to questions in the Parliament, the Prussian Minister of Public Works says that the State Railroads had contracted for coal for the two years 1904 and 1905 with the coal syndicate and other miners at 10½ marks (\$2.50) per kilometric ton for Ruhr coal (near the Rhine) at the mines, and at \$2.40 for Silesian coal. The rails (about 280,000 tons) this year will cost \$26.66 per ton, and steel sleepers, of which 150,000 tons will be used, \$25.47. Preserved oak ties cost \$1.56 each, preserved beech ties \$1.54, steel ties \$1.46, preserved pine ties \$1.05, and whether one is more economical than another depends on the circumstances in each case. The process of preserving ties is very costly, and experiments are made in the hope of reducing it, in which case more beech would be used, which can be had in Germany. As it is, the number of beech ties used has increased from 82,000 in 1901 to 395,000 in 1903.

The lines with heaviest traffic are being renewed with

rails weighing 82 lbs. per yard. Of 12,500 miles of such lines nearly 5,000 miles have been renewed already, and 670 miles will be changed during the current year. The question is considered whether it will not be well to use 90-lb. rails on the sections with very heavy traffic and a wheel-load of 10 tons.

The application of American automatic couplings on freight cars has not yet been decided upon, but such couplings are being tried on some through passenger trains. One of the chief obstacles is that the change cannot be made by the Prussian State Railroads alone, but to permit interchange of cars it should be introduced simultaneously on all continental railroads. The cost of the change for Prussia alone would be about \$50,000,000.

The number of open cars owned by the State Railroads, April 1, 1903, was 55,679 of 10 tons (22,000 lbs.) capacity, 41,554 of 12½ tons capacity, and 87,469 of 15 tons capacity. The State Railroads have now 3,543 cars of 30 tons (66,000 lbs.) capacity, against 2,455 in 1897.

Illegal Allowances to Lumber Shippers.

The Interstate Commerce Commission, in an opinion by Commissioner Prouty, has announced its decision in the case of the Central Yellow Pine Association vs. the Vicksburg, Shreveport & Pacific and others, known as the "tap line" case. The question presented is whether divisions or allowances from published rates made by the defendants to short lines owned and controlled by lumber mills constitute departures from such published rates in violation of the law. Defendants publish a certain rate on lumber from stations upon their lines which must be strictly observed and charged to all shippers alike, and they are not entitled to grant a division of the rate to the owner of a lumber mill as compensation to him for the cost of bringing his logs to the mill by steam railroad, horse railroad, wagon, or any other means of conveyance.

A common carrier can allow a division of rates only to another common carrier which, participating in the particular traffic to which the rate is applied, is subject to the act to regulate commerce. The two lines may by contract or agreement establish a joint rate from the point of origin on the one road to the point of destination on the other and agree between themselves as to divisions of the rate. The transportation of the log to the mill by one line and the transportation of the lumber from the mill by another line may, under the circumstances of this case, be treated as in the nature of a through shipment from the point where the log is received to the point where the lumber is finally delivered, and the carrier of the lumber may by joint arrangement with the log carrier make such allowance towards the cost of moving the log as would be fairly involved in moving the lumber from the point where the log is received for carriage, provided always that the carrier of the log is a common carrier by rail; but this holding extends the application of the principle of milling in transit to the extreme limit.

Treating the transportation first of the log and then of the lumber as a through shipment involves the right to mill in transit, and when that privilege is granted the tariff should show upon its face that the transportation covers carriage of the log to and the lumber from the mill, and the division allowed to the "tap line," or carrier of the log should be named in all cases.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page 16.)

Franklin Institute, Philadelphia.

At a meeting held April 14 addresses were given on Telferage, by C. J. Messer, and on the Diaphragm Storage Battery, by J. Harp Robertson.

American Association of Local Freight Agents' Associations.

The next annual convention of this Association will be held at Peoria, Ill., June 14. G. W. Dennison, Secretary, Toledo, Ohio.

New York Railroad Club.

At the meeting, April 15, Mr. R. H. Soule will open a discussion on "Boiler Design," and Mr. Walter W. Curtiss, of Chicago, will read a paper on "Timber Preservation and Timber Treating Plants," illustrated with lantern slides.

Rocky Mountain Railway Club.

At the regular meeting of this club, held in Denver, April 12, a paper on "Cylinder Clearance and the All-Free Hubbell Valve Gear and Their Relation to Valve Events and Steam Economy," was read by Willis C. Squires, of St. Louis.

Canadian Freight Association.

At the annual meeting of this association, held in Montreal, April 7, the following officers were elected: President, Carl Howe, Buffalo; Vice-Presidents, W. R. McInnes, Montreal, and George Collins, Trenton, and Secretary, John Earls, Toronto.

Western Railway Club.

The April meeting will be held at 2 o'clock p. m. on Tuesday, the 19th inst., in the Auditorium Hotel, Chicago. There will be papers by Mr. C. G. Y. King, of the General

Electric Company, on "the Steam Turbine," illustrated by stereopticon views, and by Mr. H. H. Vaughan, Superintendent of Motive Power of the Canadian Pacific, on "The Value of Heating Surface." The committee on suggestions for revision of the Rules of Interchange will also report.

Railway Signal Association.

The May meeting of this association will be held at the Grand Union Hotel, New York City, on Tuesday, the tenth, at 2 o'clock p. m. The Committee on Definitions and Nomenclature will present a report and will invite criticism and discussion of its subject matter. Some definitions which have already been formulated and a list of words and terms which have not yet been considered in committee have been sent to members in a circular. Members are asked to bring with them to the meeting small drawings or pictures of things which it is difficult to describe without drawings. Further announcements may be made in the railroad papers of April 28-30.

PERSONAL.

—Mr. Isaac M. Bortle, District Passenger Agent of the Northern Pacific at Philadelphia, died suddenly on March 26.

—Mr. Robert R. Hammond, who is now the operating head of the St. Louis & San Francisco, with the title of

Second Vice-President, was born at Ottawa, Iowa, February 14, 1857. He began his railroad career in 1876 as a telegraph operator on the Chicago, Burlington & Quincy. In 1881 he went to Kansas City as an operator for the Kansas City, Fort Scott & Memphis, and was steadily advanced through the successive positions of operator, train despatcher, trainmaster and division superintendent until 1898, when he became General Superintendent. After the Kansas City, Fort Scott

& Memphis was absorbed by the "Frisco" he remained General Superintendent of that road and of the Kansas City, Memphis & Birmingham, until 1903, when he went to Chicago as General Manager of the Chicago & Eastern Illinois, also controlled by the "Frisco." Mr. Hammond was educated at Baker University in Kansas and at Iowa Wesleyan University at Mount Pleasant, Iowa.

—Mr. Samuel Hoar, for many years General Counsel for the Boston & Albany Railroad, died at his home in Concord, Mass., on April 11, at the age of 59.

—Mr. J. Austin, Division Engineer, of the Northern Division of the Chicago, Burlington & Quincy, died at his home in La Crosse, Wis., on April 1, at the age of 42.

—Mr. J. J. Gerrish, a veteran railroad man and one of the builders of the Atlantic & St. Lawrence, now a part of the Grand Trunk, died recently at his home in Portland, Me. Mr. Gerrish was born in Durham about 83 years ago. He was at one time in the railroad supply business, and also was a well-known contractor.

—Mr. R. R. Sutherland, the new Superintendent of the El Paso Division of the Chicago, Rock Island & Pacific, was born in New London, Prince Edward Island, 47 years ago. He has been in railroad service since 1870, when he began as a messenger boy on the Union Pacific. He served on the Nebraska and Wyoming Divisions in various capacities until 1881, when he was made traveling auditor of the Kansas Division. In 1883 he was made train despatcher and two years later became special clerk in charge of the Government accounts in the Superintendent's office at Omaha. From then until 1899, when he was made Trainmaster of the Eastern Division Mr. Sutherland held various minor positions. In May, 1902, he resigned his position with this company to become Superintendent of the Rock Island & Peoria, but a few months later, when this road was absorbed by the Chicago, Rock Island & Pacific, he was made Trainmaster of the Missouri Division of that road. From that position he went to the Chicago, Cincinnati & Louisville, but in November, 1903, returned to the Rock Island and was made Assistant Superintendent

of the Kansas Division. In March, 1904, he was promoted to be Superintendent of the El Paso Division, with headquarters at Dalhart, Texas.

—Mr. A. L. Goetzmann, who recently resigned as Superintendent of the Minnesota & Dakota Division of the Chicago & North Western Railway, to go into the lumber business, has opened an office in Chicago, to represent several lumber companies in the upper Mississippi valley and on the Pacific coast.

—A press despatch from Omaha says that Mr. Horace G. Burt, late President of the Union Pacific, is now in Japan, whence he will go to the Philippine Islands. It was reported a few weeks ago that Mr. Burt had accepted a commission from the Russian Government, but the present report says that he is going to return home by way of India and Egypt; though he expects first to visit China.

—Mr. Clark H. Brown, formerly a well-known railroad man, died in Iowa recently at the age of 85. Mr. Brown was born near Utica, N. Y. He was a locomotive engineer on the Boston & Albany, the first Master Mechanic on the Utica, Chenango & Susquehanna Valley, and a Division Superintendent on the Shenandoah Valley. He had also held official positions on the Atlantic City Railroad and on railroads in Iowa and California.

—Mr. William A. Turk, Passenger Traffic Manager of the Southern Railway, died at his home in Washington, D. C., on Saturday last, of pneumonia, after an illness of about three days. Mr. Turk was born in Augusta County, Va., and was educated at Roanoke College. He had been with the Southern and its predecessors for about 27 years. From 1894 to 1901 he was General Passenger Agent of the Southern, and also during a portion of that time was General Passenger Agent of the Alabama Great Southern. About three years ago he was made Assistant Passenger Traffic Manager of the whole system, and shortly afterwards was promoted to be Passenger Traffic Manager, the position he held at the time of his death.

—Mr. Samuel Sloan, the veteran President of the Delaware, Lackawanna & Western, has just celebrated the sixtieth anniversary of his marriage. Mr. and Mrs. Sloan are in good health, and their portraits were printed in the *New York Tribune*, April 4. The wedding anniversary was celebrated at their home in New York City on April 8, which also is Mrs. Sloan's birthday. Mr. Sloan was born in Ireland and is now 87 years old. Although he retired from the active management of the Lackawanna five years ago, he continues to be the Chairman of the Board of Directors, and is in his office in Exchange Place nearly every business day. He has been in railroad service about 50 years, and at the head of the Lackawanna for 32 years.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—The office of Alfred Lovell, Assistant Superintendent of Motive Power, has been removed from Topeka to Chicago.

Central New England.—R. T. Bird has been appointed Auditor, with office at Hartford, Conn.

Chicago & Alton.—W. B. Causey, hitherto storekeeper of the Chicago Great Western, has been appointed Engineer of Maintenance of Way of the C. & A., effective April 12.

Chicago & Eastern Illinois.—See St. Louis & San Francisco.

Chicago Great Western.—(See Chicago & Alton.)

Chicago, Rock Island & Pacific.—J. B. Kilpatrick, hitherto Assistant Superintendent of Motive Power at Chicago, has been appointed Superintendent of Motive Power of the Eastern Lines, and Thomas Roope, hitherto Superintendent of Motive Power at Topeka, Kan., has been appointed Superintendent of Motive Power of the Western Lines. Mr. Kilpatrick will have his office at Chicago, and Mr. Roope in Topeka.

F. C. Stimson has been appointed Division Engineer of the Arkansas Division, with headquarters at Little Rock, and H. G. Clark has been appointed Division Engineer of the Pan Handle Division, with headquarters at Oklahoma City.

W. Hodson has been appointed Assistant Treasurer, succeeding H. E. Yarnell, resigned.

T. N. Gilmore, hitherto Master Mechanic of the Terminal R. R. Association of St. Louis, has been appointed Assistant to the General Superintendent of Motive Power of the Rock Island, with headquarters at Chicago. (See Choctaw, Oklahoma & Gulf.)

Choctaw, Oklahoma & Gulf.—The following officers of the Rock Island have been appointed to the same positions on the C. O. & Gulf: H. I. Miller, General Manager; C. E. McKim, General Superintendent of Transportation; E. F. Kearney, Supervisor of Mails, and T. S. Lloyd, General Superintendent of Motive Power.

Delaware, Susquehanna & Schuylkill.—J. O. Baker has been appointed Purchasing Agent.

Grand Rapids & Indiana.—J. H. P. Hughart has been elected a Director, succeeding H. J. Hollister.

Gulf & Interstate Ry. of Texas.—The officers of this company are: President, L. P. Featherstone; Vice-President, Fox Winnie; Secretary and Superintendent, L. L. Featherstone, and Auditor, George W. Barnes.

Interoceanic of Mexico.—See Mexican Southern.

Interstate.—The office of D. B. Wentz, Vice-President, has been removed from Big Stone Gap, Va., to Philadelphia, Pa. A. H. Reeder has been appointed General Manager, with headquarters at Stonega, Va.

Mexican.—Walter Morcom, hitherto General Manager of the Mexican Southern, has been appointed General Manager of the Mexican, with headquarters at Mexico City.

Mexican International.—W. B. Ryan, General Traffic Manager of the National de Tehuantepec, has been appointed General Traffic Manager of the M. I.



Mexican Southern.—W. L. Morkill, hitherto General Manager of the Intercolonial of Mexico, has been appointed General Manager of the M. S., with headquarters at Pueblo, Mex., succeeding W. Morcom. (See Mexican.)

Midland Valley.—H. E. Yarnell has been elected Secretary and Treasurer, with office at Philadelphia, Pa., succeeding the late J. P. Hood.

Mobile, Jackson & Kansas City.—J. R. Hawkins has been appointed Superintendent, with headquarters at Mobile, Ala., succeeding R. H. Cobbs, Jr., resigned.

National of Tehuantepec.—See Mexican International.

National Railroad of Mexico.—Following the acquisition of a controlling interest in this road by the Government of Mexico, E. M. Brown, Second Vice-President and General Manager, will become President, succeeding W. G. Raoul and J. G. Metcalfe, now the President of the Mexican International, will become First Vice-President. J. F. Mackie will also leave the International for the National and will be made Second Vice-President, with headquarters in New York City. Mr. Raoul will continue to be a member of the Board of Directors.

New York Central & Hudson River.—George A. Berry has been appointed Engineer of Bridges of the New York District, with headquarters at New York City. This district comprises the Hudson Division, south of Croton; Harlem Division south of North White Plains; Putnam Division south of Yonkers, and Weehawken Terminal. Allan W. Carpenter has been appointed Engineer of Bridges of the Main Line and Branches, exclusive of the New York District, with headquarters also at New York. Charles K. Lawrence has been appointed Resident Engineer, on that portion of the Fall Brook Sub-District, Pennsylvania Division, south of Corning Yard, including Bridge B. C. 3.

D. L. Sommerville, hitherto Assistant Division Engineer at Watertown, N. Y., has been appointed Division Engineer at Jersey Shore, Pa. J. W. Eber, hitherto Supervisor of Track, has been appointed to succeed Mr. Sommerville at Watertown.

Oregon Short Line.—See Southern Pacific.

Pennsylvania Company.—The office of E. W. Westlake, Superintendent of Dining Car Service, has been removed from Chicago, Ill., to Columbus, Ohio.

Rio Grande Junction.—W. G. Choate has been appointed Superintendent, with headquarters at Grand Junction, Colo., succeeding J. R. Wentworth.

St. Louis & San Francisco.—C. H. Beggs, hitherto Second Vice-President, has been appointed Assistant to the President. R. R. Hammond, General Manager of the Chicago & Eastern Illinois, has been appointed Second Vice-President of the S. L. & S. F., with offices in Chicago and St. Louis. Mr. Hammond succeeds Mr. Beggs. A. S. Dodge, hitherto Freight Traffic Manager, has been appointed Third Vice-President, succeeding Robert Mather, who was chosen to succeed Mr. Winchell as First Vice-President. C. R. Gray, hitherto Superintendent of Transportation, has been appointed General Manager of the "Frisco" and Eastern lines, with headquarters at St. Louis.

St. Louis, Watkins & Gulf.—W. A. Meagher has been appointed Master Mechanic, with headquarters at Lake Charles, La., succeeding J. C. Ramsey. R. Gaunt, hitherto Supervisor of Bridges and Buildings, has been appointed Superintendent of Transportation.

Southern.—N. N. Boyden, hitherto Foreman of Locomotive Repairs, has been appointed Master Mechanic, with headquarters at Selma, Ala., succeeding S. M. Dolan, who has been transferred to Atlanta, Ga., as Master Mechanic, succeeding W. H. Hudson, promoted.

Southern Pacific.—E. E. Calvin, hitherto Assistant General Manager of the Oregon Short Line, has been appointed General Manager of the Southern Pacific lines in Oregon.

Terminal R. R. Association of St. Louis.—See Chicago, Rock Island & Pacific.

West Virginia Central & Pittsburgh.—J. W. Smith has been appointed Superintendent of Car Service, with headquarters at Baltimore, Md.

LOCOMOTIVE BUILDING.

The Mexican Railway is having two locomotives built at the Baldwin Works.

The Toluca & Tenango, Toluca, Mex., is in the market for one 10-wheel, narrow gage locomotive.

The Chicago, Milwaukee & St. Paul is reported to have placed orders for 30 locomotives to be built at its shops at West Milwaukee, Wis. This order is in addition to the one reported in our issue of March 11.

The Lake Champlain & Mohawk is having one mogul (2-6-0) locomotive built at the Schenectady Works of the American Locomotive Co. This locomotive will be delivered during the present month. It will weigh 143,000 lbs., with 125,000 lbs. on drivers; cylinders, 19 in. x 26 in.; diameter of drivers, 50 in.; wagon-top boiler with a working steam pressure of 100 lbs.; tank capacity for water, 4,500 gallons, and coal capacity, 5 tons. The special equipment includes: Westinghouse air-brakes, sectional Magnesia boiler lagging, Tower couplers, Sellers injectors, Jerome piston rod and valve-rod packings, Coale safety valves, Leach sanding devices, Nathan triple sight-feed lubricators, American Locomotive Co.'s brake-beams, brake-shoes, journal bearings, springs and steam gages; cast-steel wheel centers and Richardson balance valves.

CAR BUILDING.

The Elgin, Joliet & Western is in the market for 250 dump cars.

The Chicago Union Traction Co. will soon ask bids on 100 cars.

The Great Northern is about to build 500 freight cars at its own shops.

The Toledo & Ohio Central has ordered seven passenger coaches from the Pullman Co.

The Northern Pacific is reported to be about to build 850 box cars and 150 refrigerator cars at its own shops.

W. H. Piper & Co. are having 100 freight cars built at the McKees Rocks Works of the Pressed Steel Car Co.

The United States Leather Co. is having 30 freight cars built at the McKees Rocks plant of the Pressed Steel Car Co.

The American Leather Co. is having 12 freight cars built at the Berwick Works of the American Car & Foundry Co.

The Chicago, Burlington & Quincy is reported to be

about to let an order for 1,000 box cars of 80,000 lbs. capacity.

The Logan Coal Co., Philadelphia, is having 150 freight cars built at the McKees Rocks Works of the Pressed Steel Car Co.

The Seaboard Air Line has ordered 500 plain box cars of 80,000 lbs. capacity from the American Car & Foundry Co., and 500 ventilated box cars of 60,000 lbs. capacity from the South Baltimore Car Works. The specifications for these cars were published in our issue of March 25.

The Maryland & Pennsylvania has ordered 10 box cars of 60,000 lbs. capacity from the South Baltimore Car Works for April, 1904, delivery. These cars will be 36 ft. long and will weigh 20,000 lbs. The special equipment includes: Sterlingworth brake-beams, Buckeye couplers and Westinghouse air-brakes.

The New York Central & Hudson River is having three baggage and mail cars built by Osgood, Bradley & Sons for delivery about May 1. These cars will be 60 ft. 10 in. long, 9 ft. 8 in. wide and 14 ft. high. The special equipment includes: Westinghouse air-brakes, Gould couplers, New York Central & Hudson River standard heating system, Pintsch gas and Sherwin-Williams paint.

The Vandavia is in the market for 100 steel gondolas of 100,000 lbs. capacity, 50 steel underframe flat cars of 100,000 lbs. capacity and 11 cabooses. The gondolas will weigh 40,000 lbs. and will be 38 ft. 2½ in. long, 9 ft. 3¼ in. wide and 3 ft. 9 in. high, all inside measurements. The flat cars will be 40 ft. long and 9 ft. 3 in. wide. The cabooses will be 30 ft. 1½ in. long and 9 ft. 1½ in. wide. Special equipment includes: Westinghouse air-brakes for gondolas and flat cars and Tower couplers for all cars.

BRIDGE BUILDING.

AUGUSTA, GA.—The Council will probably ask the War Department to extend for five years the time in which the city must put draws in the bridges across the Savannah River.

AUSTIN, TEX.—It is reported that the International & Great Northern will build a new bridge over the Colorado River at Austin.

A new bridge is to be built to replace the present structure over the Colorado River.

BELLEVILLE, ONT.—O'Brien's bridge has been carried away by ice. The original cost of the structure was about \$20,000.

BOWLING GREEN, OHIO.—The commissioners of Wood County will issue \$50,000 of bonds, the proceeds to be used to restore bridges along the Maumee River, which were carried away by recent floods.

BUENA VISTA, PA.—Allegheny and Westmoreland counties are considering the building of a new bridge over the Youghiogheny River to cost about \$75,000.

CHAMBLEY, QUE.—The two bridges over the Richelieu River have been carried away by recent floods.

CLEVELAND, TENN.—The County Court has appropriated \$700,000 to build a steel bridge over Candy's Creek at Williams Ford.

COBOURG, ONT.—Bids are wanted May 3 by the County Clerk for building the superstructure of a bridge of five spans, 400 ft. long with 18 ft. roadway over the river Trent in the village of Campbellford. Esli Terrill, Commissioner.

COLUMBUS, OHIO.—An ordinance has been passed by the City Council authorizing the Board of Public Service to pay \$63,000 towards building the Fishinger Mill bridge, the balance to be paid by Franklin County. George D. Jones is President of the City Council.

COUNCIL BLUFFS, IOWA.—On April 6 the House of Representatives passed a bill extending the time for the completion of a railroad and wagon bridge across the Missouri River, at Council Bluffs, until Jan. 1, 1905.

CULBERHOUSE, ARK.—The Manila & Southwestern Ry. Co. will build a long trestle over the St. Francis River in Craighead County northeast of this place on the line of its proposed road between Manila and Culberhouse.

DENVER, COLO.—Bids are wanted, April 26, by L. G. Carpenter, State Engineer, for building a bridge of 343 ft. or 265 ft., to be of steel or steel and wood construction, over the Grand River, between Rifle and Parachute, near Morris Siding, in Garfield County.

DES MOINES, IA.—Plans, it is reported, are ready for building a viaduct over the tracks at Vine street, at a cost of about \$180,000.

EVERETT, WASH.—Bids are wanted, May 16, by J. H. Mitchell, City Clerk, for building a steel bridge with a 233-ft. draw, and two fixed spans each 124 ft. long and 22 ft. wide, over the Snohomish River, to cost between \$30,000 and \$65,000. W. D. Barduff is City Engineer.

HARRISBURG, PA.—Viewers have been appointed preparatory to building bridges in Columbia County as follows: Shermantown Bridge, Catawissa Bridge, Fisher Bridge, Catawissa Creek Bridge, Paper Mill Bridge, Breisch Bridge; and, in Armstrong County, for the bridge over Mahanoy Creek in Mahanoy Furnace.

HATTIESBURG, MISS.—The Board of Supervisors has authorized the building of an iron bridge over Leaf River, to cost about \$10,000. Bids will be asked in June.

HICKMAN, KY.—Bids may soon be asked by C. L. Walker for building a 250-ft. bridge.

INDIANAPOLIS, IND.—Bids are wanted April 18 by the Board of Commissioners of Marion County for building nine bridges.

Bids are wanted May 2 by the Board of County Commissioners for building a bridge over Lick Creek on Bluff Road. John E. McGaughey is Commissioner.

ITHACA, N. Y.—The city has plans ready to build two iron bridges. Bids will soon be asked.

JERSEY CITY, N. J.—A bill has passed the State Senate authorizing the city to build a viaduct from the lower section of the city to Jersey City Heights.

LIVINGSTON, TENN.—The Overton County Railroad Co. will build two or three steel bridges along the line of its proposed road between Algood and Livingstone.

MATADOR, TEXAS.—An issue of \$24,500 of bonds has been voted for building bridges.

MINNESOTA.—A bill was introduced in the U. S. Senate on April 5 and in the House of Representatives on April 4, authorizing Itasca County, Minn., to build a bridge over the Mississippi River.

MISSISSIPPI.—A bill has passed both Houses of Con-

gress, authorizing W. Denny & Co. to build a bridge over Dog River, in Mississippi.

MONCTON, N. B.—Bids are asked by C. H. La Billois, Commissioner of Public Works, at Fredericton, for the New Hall's Creek bridge.

MONTREAL, QUE.—The Intercolonial R. R. has given a contract to M. P. Davis, of Montreal, which includes the building of a two-track bridge 800 ft. long over Chaudier River on the Levis side of the St. Lawrence River.

NEW CASTLE, IND.—Henry County has appropriated \$10,000 for repairing bridges and culverts damaged by flood.

NEW HAVEN, CONN.—Bids will be asked early next month for building a Scherzer rolling lift bridge on Kimberly avenue over West River. C. W. Kelly is City Engineer.

NEW YORK, N. Y.—The following bids were opened April 8 by Bridge Commissioner Best for the bridge over Flushing Creek between Broadway, Flushing, and Jackson avenue, Newtown, which is to consist of three spans, with a total length of 743 ft. and an opening of 60 ft. Snare & Triest Company, Manhattan, \$257,842, was the lowest of six, and it is generally understood that the award will go to that firm. There was nearly \$100,000 difference between this bid and that of R. H. Hood Company, \$356,156. The other bidders were: F. V. Smith Company, \$276,777; Williams Engineering and Construction Company, \$284,076; King Bridge Company, \$322,687, and P. J. Murray, \$332,583.

NORTH DAKOTA.—Both Houses of Congress have passed a bill authorizing a bridge to be built over the Missouri River between Wanbushka, Burleigh Co., and Morton Co., N. Dak. (March 18, p. 221.)

PARKVILLE, MO.—A bill extending the time for the completion of the bridge over the Missouri River, at Parkville, has been passed by both Houses of Congress.

PATERSON, N. J.—The Board of Freeholders has recommended that a contract be awarded to the Cyclopean Iron Works at \$27,800 for building a concrete bridge with 30-ft. roadway on East Thirty-third street.

PEORIA, ILL.—An election will be held April 19 to decide the question of issuing bonds for building a steel bridge to replace the present structure at the foot of Bridge street over the Illinois River. H. E. Bensley is Chief Engineer.

The highway bridge over the Illinois River has been damaged by floods to the amount of about \$75,000.

PETERBOROUGH, ONT.—The Sheppard and Byron bridges will have to be replaced with steel structures.

PUEBLO, COLO.—Plans are being made for building the viaduct at Main street over the tracks of the Denver & Rio Grande. The proposed structure is to be about 707 ft. long, with 56-ft. roadway and 12-ft. sidewalks.

SAN FRANCISCO, CAL.—The bridge at San Jose and Mt. Vernon avenues is to be widened 60 ft. at a cost of about \$14,000.

SOUTH OMAHA, NEB.—The Burlington & Missouri River will build a viaduct about 687 ft. long, consisting of one iron span, with a trestle approach, the work to be done by the company's forces. I. S. P. Weeks, Lincoln, Neb., is Chief Engineer.

THIEF RIVER FALLS, MINN.—Both Houses of Congress have passed the bill authorizing a railroad bridge over Red Lake River, at Thief River Falls. (March 25, p. 247.)

TROY, OHIO.—Bids are wanted April 19, by the County Commissioners for a steel bridge over Stillwater River to consist of two spans, each 117½ ft. long and 16 ft. wide. E. E. Pearson is County Auditor.

VANCOUVER, B. C.—The Council has extended to April 25 the time for receiving bids for the bridges to be built over the Capilano and Seymour Rivers.

WAPAKONETA, OHIO.—Bids are wanted May 4 by the County Commissioners for building one 130-ft. and one 150-ft. steel bridge over the Auglaize River in Auglaize County.

YOUNGSTOWN, OHIO.—Surveys are being made by the Pittsburg & Lake Erie for building a steel overhead bridge over the tracks from the plant of the Youngstown Iron Heat & Tube Co. to a point on the property of the East Youngstown Land & Improvement Co.

Other Structures.

AKRON, OHIO.—The Twentieth Century Heating & Ventilating Co. will build additions to its works and put in new machinery.

ALEXANDRIA, LA.—The Orange Iron Works, Orange, Texas, has bought land in Alexandria for a foundry and machine shops, for which plans are being made.

BINGHAMTON, N. Y.—The Erie, it is reported, is making plans to remodel its station.

CLINTON, ILL.—The Illinois Central, it is reported, will at once put up a roundhouse. The company is also in the market for some new machinery.

DECATUR, ALA.—The Louisville & Nashville, it is reported, will build a stone and brick passenger station jointly with the Southern.

EVANSVILLE, IND.—The Illinois Central is making plans to build shops, for which the contract, it is reported, will be let in June.

KANKAKEE, ILL.—The Cleveland, Cincinnati, Chicago & St. Louis reports say, will build a new brick passenger station.

MINNEAPOLIS, MINN.—Bids will be asked about May 1 by the Minneapolis, St. Paul & Sault Ste. Marie for a new brick office building of six stories, 80 ft. x 120 ft., to cost about \$125,000 for building and \$30,000 for equipment.

OMAHA, NEB.—Plans are being made by J. F. Twomey for building a grain elevator and mills, with a power plant, for which bids will soon be asked.

PHILADELPHIA, PA.—The William Cramp Ship & Engine Building Co. has filed plans with the Building Bureau for a building of corrugated iron on a steel frame one story high, 42 ft. x 319 ft.

The Midvale Steel Co. will soon ask bids for building a tempering plant to consist of a main building 68 ft. x 504 ft., a furnace shed 68 ft. x 432 ft., and a gas house 32 ft. x 378 ft.

TRENTON, N. J.—The Pennsylvania is preparing plans for new shops at Trenton. The contracts for foundations and grading have been let, but the plans for the buildings are not yet ready.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

AMARILLO, CANYON CITY & LUBBOCK.—This company is to be organized in Texas to build a railroad from Canyon City south to Lubbock, about 100 miles. The territory to be traversed is entirely without railroad facilities. It is stated that the headquarters of the company will be at Canyon City, Texas.

ATLANTIC COAST LINE.—An officer writes that the Sanford & St. Petersburg branch will be made standard gage during the coming summer. The work will be done by the company's forces. This branch is approximately 151 miles long and extends from Sanford, Fla., to St. Petersburg.

CALIFORNIA & ARIZONA.—Incorporation has been granted this company in Oklahoma Territory with headquarters at Guthrie. J. Alexander and J. E. Nicholson, of San Francisco, and G. B. Pattison, Guthrie, Okla. T., are incorporators.

CANADIAN PACIFIC.—Application is being made by this company at the current session of the Dominion Parliament for an act authorizing the construction of a line from Weyburn, Assiniboia, in a northerly direction to Heward, connecting the Souris and Pipestone branches.

CHICAGO & EASTERN ILLINOIS (C. R. I. & P.).—It has been officially announced that the new cut-off which this company is building between Woodland, Ill., and Villa Grove, 60 miles, will not be opened until July 1. The severe weather has interfered with the progress of the work.

CHICAGO & NORTH WESTERN.—An officer writes that this company is not contemplating any change of line between Omaha and Chicago.

CHICAGO GREAT WESTERN.—An officer writes that the articles of incorporation of the De Kalb & Great Western have been amended so as to cover an extension from a point in Ogle County, Ill., to Peoria. It is not known, however, when work will be begun. (April 1, p. 264.)

CHICAGO, SOO & NORTH ATLANTIC RY. & STEAMSHIP CO.—Application will be made at the current session of the Dominion Parliament for the incorporation of this company, with power to build a railroad from Sault Ste. Marie to a point on James Bay, Ont., and thence in a northeasterly direction through Quebec province to Hamilton Inlet on the coast of Labrador. The company will also ask for power to operate steamers on the waterways touched by the railroad. W. R. Grundy, Toronto, Ont., may be addressed.

CHIHUAHUA & PACIFIC.—A contract has been awarded to M. K. Ryan and R. M. Dudley, of Chihuahua, Mex., for building the extension of this line from El Carpio through Minaca to Temosachic, 60 miles. Work will be begun at once. H. W. Edwards, Chihuahua, Mex., is Chief Engineer. (See Construction Supplement.)

DALLAS & NEW MEXICO.—Arrangements are reported to have been completed for resuming work on this road. The proposed route is from Dallas, Texas, to Roswell, N. Mex., 450 miles. A length of about 60 miles has already been graded. E. P. Spears, Dallas, Texas, is President and General Manager.

DELRAY CONNECTING R. R.—Articles of incorporation have been filed by this company in Michigan with a capital stock of \$50,000. It is proposed to build a line in Ecorse and Springwells townships in Wayne County connecting the Detroit Union Depot Co.'s tracks with the Pere Marquette, the Wabash, the Michigan Central and the Detroit Southern railroads. The road will be two miles long. Maps of the line have been filed with the Board of Railroad Crossings for approval. R. E. Clapp, C. E. Herbert, E. H. Bingham and others are incorporators.

DENVER, NORTHWESTERN & PACIFIC.—Press reports state that the tunnel which this company proposes to pierce through the Continental Divide will be four miles long instead of 2½ miles long, as originally planned. By this change a number of heavy grades can be avoided. It is stated that it will take about 3½ years to complete the tunnel and it is estimated that the cost will be in the neighborhood of \$2,000,000 a mile.

GREAT NORTHERN.—A contract has been awarded to A. Guthrie & Co. for the extension of the Thief River Falls branch of this road in a northerly direction into Rosseau County. The new contract covers a distance of 31 miles.

GREENVILLE & KNOXVILLE.—A charter is being asked for this company in South Carolina to build a railroad from Greenville, S. C., to a point on the boundary of the state of North Carolina. The road will pass through Travelers' Rest, Marietta and River View. H. H. Prince, Greenville, and W. H. and D. C. Patterson, Atlanta, are interested.

GULF & PACIFIC.—This company has been chartered in Texas to build a railroad from Velasco to Paris, 345 miles, with a branch line from a point in Anderson County to Dallas, Texas, 115 miles. It is stated that eight miles had already been built before the company applied for a charter. The portion completed runs from Chinesburg, on the Gulf, Colorado & Santa Fe, in Montgomery County, Texas, north to a point in San Jacinto County. It is reported that the company will soon be in the market for a large amount of construction materials. T. J. Thornhill, R. S. Waldron, W. H. Steele, J. R. England, and others, of Dallas, Texas, are incorporators. (April 8, p. 282.)

GILPIN & CLEAR CREEK DISTRICT.—Articles of incorporation have been filed by this company in Colorado. It is stated that the company will build and equip lines for the hauling ore from mining properties. One line will be built to connect with the Denver Northwestern & Pacific. J. J. McShane, Central City; C. E. Oehler and L. F. Willoughby, of Denver, are incorporators.

HAGERSTOWN ELECTRIC.—Surveys are reported in progress for an extension of this company's line from Boonsboro, Md., to Myersville, seven miles. It is stated that work will be begun early in the summer. P. E. Piper, Hagerstown, Md., is in charge of the surveys.

ILLINOIS, IOWA & MINNESOTA.—This company is reported to have increased its capital stock from \$100,000 to \$5,000,000. The route of its proposed line is through Rockford, Joliet, De Kalb, Moline, Valparaiso and Michigan City and a branch will eventually be built from Rockford to Beloit, in Wisconsin. Work is now in progress between Moline and Rockford, 100 miles, and it is stated that this part of the line will be opened by July 1. H. W. Seaman is President and L. W. Troxel, Aurora, Ill., is Chief Engineer. (See Construction Supplement.)

INTERCOLONIAL.—A contract has been let to M. P. Davis, Montreal, Que., for building a second track from the north side of Quebec Bridge to Quebec and from the south side of Quebec Bridge to a point on the main line,

a total distance of about eight miles. The contract includes the building of a two-track bridge 800 ft. long over the Chaudiere River on the Lewis side of the St. Lawrence River. Work is to be begun May 1.

KANSAS CITY & TOPEKA (ELECTRIC).—A charter has been granted this company in Kansas to build an electric railroad from Topeka east to Kansas City, 50 miles. J. A. Van Osdel, Anderson, Ind., is President.

LIBERTY-WHITE.—Press reports state that the grading will be completed by July 1 on this new line from McComb City, Miss., to Liberty, 25 miles. Track laying will then be begun and it is stated that the line will be completed before the end of 1904. J. J. White, McComb City, Miss., is President, and R. T. Powell is in charge of the work. (See Construction Supplement.)

LOUISIANA RAILWAY & NAVIGATION CO.—Press reports state that this company has let a contract to Winston Bros., Lee & Crane, Minneapolis, Minn., to build the extension from Baton Rouge, La., to New Orleans, 78 miles. W. E. Hawley, Shreveport, La., is Chief Engineer. (See Construction Supplement.)

MANILA & SOUTHWESTERN.—An officer writes that work will soon be begun on this new railroad from Manila, Ark., to Culberson, 25 miles. It is proposed to build the entire line this year. The work will include one long trestle over the St. Francis River northeast of Culberson. W. B. Smith, Manila, Ark., is President. (April 1, p. 264.)

MARYSVILLE & SUSANVILLE.—Articles of incorporation have been filed by this company in California. It is proposed to build a railroad from Marysville to a point in the Honey Lake Valley near Susanville, and from Susanville to a point on the boundary line between California and Nevada. The total length of the line is approximately 200 miles. The authorized capital is \$7,000,000. Names of parties interested are not given.

MEXICAN ROADS.—Surveys are reported in progress on a new line from Culiacan, in the State of Sinaloa, Mex., to Topia, in the State of Durango, 75 miles. Connection will be made with the Western R. R. of Mexico at Culiacan. Lewis Warfield, Culiacan, Mex., is interested.

MISSOURI, KENTUCKY & VIRGINIA.—It is stated that surveys have been completed for this road from Kansas City to Columbia, Ky., and thence to Norfolk. Financial arrangements are now being made and 40 miles are under construction. It is reported that grading on 160 more miles will be begun in the fall. The maximum curvature is 2 degrees and the maximum grade .4 per cent. S. Dobbins is Chief Engineer.

MUSKOGEE UNION.—At a recent meeting of the directors of this company, it was voted to extend the line southwest from Muskogee, Ind. T., to the Red River, and for this purpose the capital stock was increased from \$1,200,000 to \$7,500,000. The road is now being built from Muskogee, Ind. T., to Wagoner. C. N. Haskell is President.

NATIONAL R. R. OF MEXICO.—Press reports state that work is progressing favorably on the Matamoros branch of the National R. R. of Mexico and that grading will be completed by June 1. The line is being built from Monterey east to San Miguel, 120 miles. (See Construction Supplement.)

NEW JERSEY SHORT LINE.—This company, which was recently incorporated in New Jersey, has awarded a contract to the Railroad Construction Company, of Philadelphia, for building its railroad (electric) from Milltown through New Brunswick to Elizabeth, N. J. The contract calls for the building of 36 miles of track; 70-lb. rails will be used and the work will include bridges over the Rahway and Raritan rivers. R. D. Ashbridge, East Downington, Pa.; A. A. Moyer, Philadelphia; T. P. Curley, G. H. P. Martin and J. H. Sintzoo, Camden, N. J., are incorporators. (April 8, p. 282.)

NEW YORK, PHILADELPHIA & NORFOLK.—An officer writes that this company is not planning to build a second track between Cape Charles, Va., and Delmar. The work which is now going on consists in putting in some new passing sidings and lengthening the old ones in order to take care of the increased freight traffic. (April 8, p. 282.)

NEW YORK SHORT LINE (READING).—It has been officially announced that as soon as the weather permits work will be begun on this proposed cut-off, which will connect the Philadelphia & Newton Division of the Reading, in Bucks County, Pa., with Neshaminy. The new line will shorten the running time of the Reading between Harrisburg and New York. (See Construction Supplement.)

OVERTON COUNTY.—An officer writes that the proposed route of this road is from Algood, Tenn., northeast to Livingston, 15 miles. Work will be begun some time in May. J. C. Bilbrey, Livingston, Tenn., is President. (April 8, p. 282.)

POINT PLEASANT TRACTION.—A contract has been awarded to Michael Hurley, Trenton, N. J., for building an extension of this road from Point Pleasant, N. J., west to Lakewood, 10 miles. Work on the new line will be started as soon as materials can be secured.

SOUTHERN.—It is stated that the new yards of this company at North Birmingham, Ala., have been entirely graded and that track laying will be begun at once. The cost of these yards, when completed, will be about \$500,000.

TEXAS ROADS.—It is reported that a railroad will soon be built from Cotulla, Texas, to Carrizo Springs, a distance of 40 miles. J. W. Campbell, Carrizo Springs, Texas, may be addressed.

WESTERN PACIFIC.—Press reports state that work has been temporarily stopped on this California line. The road is projected to run from San Francisco through Sacramento, Oroville and Beckwith Pass to Salt Lake City. (See Construction Supplement.)

GENERAL RAILROAD NEWS.

BUFFALO, ROCHESTER & PITTSBURG.—This company has filed a notice at Albany of an increase in its capital stock from \$12,000,000 to \$15,000,000.

CHESAPEAKE & OHIO.—Kuhn, Loeb & Co. have bought \$4,000,000 of 5 per cent. 2-year collateral trust notes of this company. These notes are of \$5,000 denomination each and the proceeds will be used to pay for the construction of the Big Sandy branch from Whitehouse, Ky., to the breaks of the Big Sandy River in Virginia, 75 miles. The collateral deposit consists of first mortgage, 4 per cent. bonds of the Big Sandy Railroad, guaranteed by the Chesapeake & Ohio. The

notes will ultimately be refunded by an issue of bonds under the general mortgage which permits the sale of \$2,000,000 of such bonds annually.

CHICAGO, BURLINGTON & QUINCY.—This company has sold to Clark, Dodge & Co., of New York, and to Lee, Higginson & Co., of Boston, \$14,492,000 Illinois division bonds maturing in 1949. The Commercial & Financial Chronicle says that these bonds are the remainder of the authorized issue of \$85,000,000, a sufficient amount having first been reserved to retire at maturity \$21,699,200 4s due July 1, 1905, and \$2,320,000 Chicago & Iowa division 5s due Feb. 1, 1904. On the payment of these old issues, the Illinois division bonds will become a first lien on all the company's lines east of the Mississippi River. The bonds which have just been sold, are four per cents. It is said that the proceeds of the sale will be used to acquire new cars and engines and terminal facilities, and to fund short term obligations incurred for improvements during the last two years, including the \$5,000,000 of 5 per cent. notes which were due a month ago, but which were renewed.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—Blair & Co., New York, have agreed to purchase for this company 2,400 freight cars costing \$1,544,049. In return, the railroad will make a cash payment of \$344,049 and will issue bonds for the balance of \$1,200,000. These bonds will be of \$1,000 denomination and will bear 4 per cent. interest, maturing in 14 semi-annual installments of \$85,000 each.

DELAWARE, LACKAWANNA & WESTERN.—The Board of Public Works of Newark has sanctioned the plan of the Delaware, Lackawanna & Western, the Lehigh Valley and the Public Service Corporation to abolish the grade crossing at Clifton avenue in Newark.

DETROIT & TOLEDO SHORE LINE.—This company has sold \$1,000,000 4 per cent. bonds to New York and Cleveland capitalists. The Detroit & Toledo Shore Line was formerly owned by the Everett-Moore Syndicate, of Cleveland, but was converted into a steam railroad. It is now a connecting link between the Toledo, St. Louis & Western and the Grand Trunk. The bonds are guaranteed by both the Toledo, St. Louis & Western and the Grand Trunk railroads.

FORT SMITH & WESTERN.—This company has filed a mortgage for \$7,500,000 with the Mercantile Trust Co., of New York. The proceeds from the sale of the bonds will be used to refund \$5,833,000 outstanding bonds, to pay for the building of a coal road from Fort Smith, Ark., to Coal Creek, Ind. T., and to purchase new equipment. This company recently completed its line from Fort Smith, Ark., to Guthrie, Okla. T., 152 miles.

LAKE ERIE & WESTERN.—The report of this company for the year ending Dec. 31, 1903, shows gross earnings of \$5,218,728, an increase of \$519,388. Operating expenses were \$3,857,910, an increase of \$511,067, leaving an increase in net earnings of only \$8,300. Freight earnings increased over 8 per cent., but passenger receipts decreased 2.3 per cent. During 1903, 26 miles of main track were renewed with 75-lb. rails, and 141 miles of main track were ballasted and surfaced with gravel. Seven new plate girder bridges were built, replacing four iron bridges and three trestles, and some additional land was purchased at Indianapolis to give trucking access to the yards at that point. In summarizing the traffic results of the year, President Newman says in part: "Of the expenditures made for betterments and additions to property besides items charged to operating expenses, \$64,110 have been charged to the balance of the Special Improvements Fund, thus exhausting that fund."

MISSOURI, KANSAS & TEXAS.—Blair & Co. have agreed to acquire for this company 86 locomotives at a total cost of \$1,128,743. The M. K. & T. will purchase this equipment from the firm and will pay \$190,743 in cash and the balance of \$938,000 in bonds. These bonds will be dated March 1, 1904, and will mature in fourteen semi-annual installments. They will bear 4½ per cent. interest.

NATCHEZ & WESTERN.—(See Natchez, Red River & Texas above.)

NATCHEZ, RED RIVER & TEXAS.—According to local reports from New Orleans, it is stated that this road, which runs from Vidalia, La., to Jonesville, has been sold to a syndicate headed by A. E. Davis, of Natchez. It is stated that the name of the road will be changed to the Natchez & Western.

NEW YORK, NEW HAVEN & HARTFORD.—At a special meeting of the stockholders of the Naugatuck R. R. Company, on April 9, an issue of bonds amounting to \$2,000,000 was authorized. These bonds will bear 4 per cent. interest and will be guaranteed as to interest and principal by the New York, New Haven & Hartford. The proceeds will be used to pay for double-tracking the entire line of the Naugatuck Division.

On June 1 this company will transfer all its traffic on the Central New England and Highland divisions to the Poughkeepsie Bridge route and will discontinue entirely its ferry at Fishkill.

RICHMOND, FREDERICKSBURG & POTOMAC.—See Richmond-Washington Co. below.

RICHMOND-WASHINGTON CO.—This company has sold \$2,500,000 of its 4 per cent. collateral trust bonds to Kuhn, Loeb & Co. These bonds are guaranteed jointly by the Pennsylvania, the Baltimore & Ohio, the Chesapeake & Ohio, the Southern Ry., the Atlantic Coast Line and the Seaboard Air Line. The proceeds from the sale will be used to pay for the double-tracking and revision of grades now going on on the Richmond, Fredericksburg & Potomac and the Washington Southern railroads.

ROCK ISLAND CO.—This company has issued \$5,000,000 of notes bearing 4½ per cent. These notes have been taken by the First National Bank of New York, and with the commission, the interest cost to the company will be about 5 per cent. It is understood that the proceeds will be used to pay for work now under construction. Some time ago, the Rock Island Co. authorized a bond issue of \$163,000,000. It was provided at this time that \$15,000,000 of the bonds could be issued at once, but it is understood that owing to the uncertain condition of the bond market and the difficulty of placing any new issues of bonds, the company preferred to issue notes.

UNION TRACTION (COLUMBUS).—The Union Traction Co., of Columbus, has amended its charter so as to increase its capital stock from \$10,000 to \$70,000. A. E. Appleyard is President and C. P. Craney Secretary.

WASHINGTON SOUTHERN.—See Richmond-Washington Co. above.